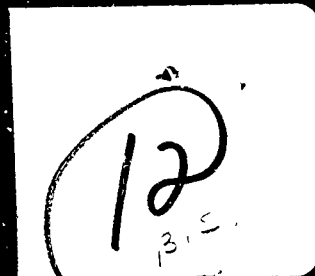
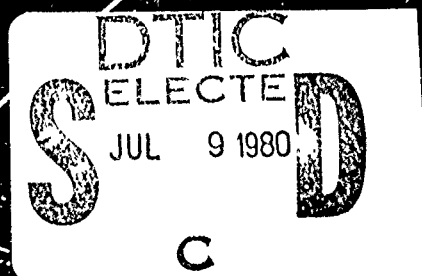


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SUMMARY OF FEDERAL AVIATION ADMINISTRATION RESPONSES TO NATIONAL TRANSPORTATION SAFETY BOARD SAFETY RECOMMENDATIONS



QUARTERLY REPORT
JANUARY THROUGH MARCH 1980

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Office of Aviation Safety
Washington, D.C. 20591

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| 16. Abstract → This report presents NTSB recommendations and all FAA responses to Board recommendations that were delivered to the Board during the applicable quarter. In addition, the report includes NTSB requests and FAA responses concerning reconsiderations, status reports, and followup actions. The Table of Contents for this report reflects only those NTSB recommendations which are still open pending FAA action (i.e., those that have not been designated as "Closed" by the NTSB as a result of acceptable FAA action). Accordingly, the Table of Contents may reflect a number of multiple recommendations (example: A-79-98 through 105), but background material is included only for those recommendations which remain in an "Open" status. Background information for those recommendations which have been closed are available in FAA headquarters files. <i>OK</i> | | | | | |
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FOREWORD

The National Transportation Safety Board as established by Public Law 93-633, Title III, "Independent Safety Board Act of 1974," has among its duties the requirement to ". . . issue periodic reports to the Congress, federal, state, and local agencies concerned with transportation safety, and other interested persons recommending and advocating meaningful responses to reduce the likelihood of recurrence of transportation accidents and proposing corrective steps."

The Act specifies that whenever the Board submits a recommendation regarding transportation safety to the FAA, or other agencies of the Department of Transportation, that the agency shall respond to each such recommendation formally and in writing not later than 90 days after receipt thereof. The Act also requires that the response to the Board shall indicate the agency's intention to initiate adoption of the recommendation in full or in part, or to refuse to adopt such recommendation, in which case the response shall set forth in detail the reasons for the refusal.

Publish a notice in the Federal Register of each recommendation and the receipt of a response from the agency. There is no requirement to publish either the recommendation or the response in its entirety.

The Federal Aviation Administration places a high priority on the evaluation of the Board's investigation and its recommendations. In recognition of the importance of these recommendations and the responses, the FAA, beginning with the first quarter of calendar year 1980, will publish quarterly reports of NTSB recommendations and all FAA responses to Board recommendations that were delivered to the Board during the applicable quarter. In addition, the report includes NTSB requests and FAA responses concerning reconsiderations, status reports, and followup actions.

The NTSB system of priority classification for action provides for documented NTSB followup action for each safety recommendation in accordance with one of the following classifications:

1. Class I - Urgent Action: Urgent commencement and completion of action is mandatory to avoid imminent loss of life or injury and/or extensive property loss.
2. Class II - Priority Action: Priority commencement of action is necessary to avoid probable loss of life or injury and/or property loss.
3. Class III - Longer-Term Action: Routine action is necessary so that possible future injury and loss of life and property may be avoided.

The purpose of this publication is to provide a systematic quarterly update and summation of NTSB Safety Recommendations and FAA actions and responses. This document is intended to keep the public abreast of NTSB and FAA efforts in the area of aviation safety for the applicable quarter covered by the report.

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NEW RECOMMENDATIONS

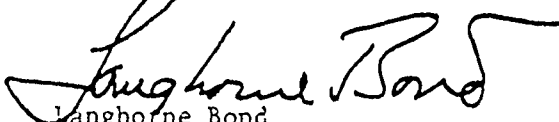
Following is a listing of the 22 new recommendations received during the first quarter of CY 1980:

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|----------------------|---|-----|
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A-79-81. Expedite rulemaking which would make the flight time and duty time limitations, and rest requirements for commuter air carriers, the same as those specified for domestic air carrier crewmembers under 14 CFR 121.

Comment. Considerable work has been done on amending the present flight and duty time requirements for both 14 CFR 135 and 14 CFR 121 to provide compatible requirements. The final draft of the Notice of Proposed Rule Making does provide for identical requirements for Parts 135 and 121. The Supplemental Notice of Proposed Rule Making, Notice No. 78-3E, on this subject, should be issued by the end of March 1980.

Sincerely,


Langhorne Bond
Administrator

SUMMARY

Statistics for CY 1979 included:

108 New recommendations issued to FAA.

46 Recommendations officially "CLCSED" during this period.

The following exchanges of NTSB/FAA correspondence concerning NTSB Safety Recommendations occurred during the first quarter, January 1 - March 31, 1980:

- FAA initial responses to NTSB recommendations:

14 letters involving 30 recommendations

- FAA letters to NTSB discussing reconsideration of earlier responses, current status or followup actions:

3 letters involving 5 recommendations

- FAA "final report" letters to NTSB:

4 letters involving 4 recommendations

Officially "Closed" by NTSB-----18 recommendations

There were three FAA responses to four Class I--Urgent Action recommendations during this quarter.

| <u>Accident Date</u> | <u>Recommendation Number</u> | <u>Issue Date</u> | <u>Response Date</u> | <u>FAA Action</u> |
|--------------------------------|----------------------------------|-------------------|----------------------|--|
| 4/18/79 | A-79-85 | 11/19/79 | 2/15/80 | Nonconcur 2/15/80 |
| 9/30/79 | A-79-91 | 11/28/79 | 2/26/80 | AD issued 2/7/80 |
| 11/9/79 (near collision) | A-79-106 & 107 | 12/28/79 | 1/7/80 | Rulemaking action in process 1/7/80 |

The FAA response to Class I - Urgent Action recommendations is reflected by the following summaries:

A-79-85. On April 18, 1979, a Sikorsky S-61L helicopter crashed at Newark International Airport. The Board determined that the probable cause of the accident was the separation of the tail rotor assembly and gearbox from the aircraft at an altitude which made further controlled flight impossible. Metallurgical examination of the blade's spar revealed a fatigue fracture across 90 percent of its cross section 35" from the outboard end. The Board stated that the blade is designed and manufactured so that the spar is completely enclosed in an aluminum skin envelope, thereby making visual inspection of the spar impossible. The Board issued Recommendations A-79-25 and 26 on April 19, 1979, which addressed the S-61L tail rotor blade failure; and the FAA responded on April 20, 1979, issuing an emergency airworthiness directive which required immediate dye penetrant inspection of the blades and tail rotor gear box mounting feet, followed by recurrent ultrasonic and visual inspection of the tail rotor blades. Two hundred and fifteen days after the accident, the Board issued another recommendation, A-79-85, on the same subject and applied the same rationale to the Sikorsky S-58 and S-58T, because they said, the Sikorsky S-58 and S-58T model helicopter uses a tail rotor blade identical in design to the S-61L model blade, although dimensionally it is smaller in the spanwise direction. After reviewing the facts and circumstances surrounding the S-61L accident and their application to the S-58 and S-58T, the FAA, on February 15, 1980, advised the Board that it did not concur because the loads and stresses on the S-58 tail rotor blades are less than those on the S-61. The FAA determined that neither the accident history nor the documentation supplied by the Board were conclusive.

The operational history of the S-58 and S-58T helicopter revealed only one possible incident of fatigue failure of the spar in over 20 years of service. Thus the nonconcurrence was based upon the lack of documentation supporting the Board's recommendation.

A-79-91. On September 30, 1979, a West Coast Air Service, Ltd., DeHavilland DHC-6-200 Twin Otter, Canadian Registry C-FWAF, crashed on final approach to Porpoise Bay, British Columbia, Canada. According to the NTSB, a failure mode analysis by the aircraft manufacturer has shown that if the propeller reversing interconnect linkage on aircraft equipped with Pratt & Whitney PT-6-6A, -6B, -6C/20 and -20 series should fail or become disengaged, under some flight conditions, the propeller can go into reverse. Fifty eight days after the accident, on November 28, 1979, the Board issued a recommendation addressing the possibility of unwanted reverse pitch in the subject aircraft. On February 26, 1980, the FAA advised the Board that on February 7, 1980, an Airworthiness Directive No. 80-04-02 had been issued applicable to Pratt & Whitney of Canada PT6-6A, -6B, -6C/20 and -20 series engines. This directive required inspections to assure conformance to the aircraft manufacturer's propeller reversing linkage rigging specifications.

A-79-106 and 107. On September 25, 1978, PSA-182 and a Cessna 172 N77116, collided in midair over San Diego, California. Flight 182 was on an IFR flight plan and had been cleared for a visual approach to Runway 27 at Lindberg Airport. The Cessna, which was on a VFR flight plan, had completed an ILS approach to Runway 9 at Lindberg Field and was proceeding northeast. When the collision occurred, Flight 182 was communicating with Lindberg Tower, while the Cessna was communicating with the Miramar RATCF.

On October 18, 1978, the NTSB issued Recommendation No. A-78-77, which recommended establishment of a Terminal Radar Service Area (TRSA) at Lindberg Airport, San Diego, California. The Board also issued A-78-78, which further recommended that the FAA review procedures at all airports used regularly by air carrier and general aviation aircraft to determine which other areas require a TRSA or a TCA and establish appropriate ones.

On December 27, 1978, the FAA issued a Notice of Proposed Rule Making (published in the January 4, 1979, Federal Register) calling for an expanded network of TRSA and TCA operations, including those for the San Diego area.

On April 19, 1979, a TRSA was implemented at Lindberg Airport, San Diego, California. In addition, the airport traffic control tower was equipped with BRITE alphanumerics (commissioned January 22, 1979) and Minimum Safe Altitude Warning (MSAW) and conflict alert enhancements (commissioned February 14, 1979).

On July 3, 1979, NTSB advised FAA that A-78-77 was classified as "Closed--Acceptable Action."

During November 1979 two near-midair collisions between air carrier and private aircraft occurred within the San Diego TRSA. In each case, the air carrier was operating under instrument flight rules and the private aircraft was operating under visual flight rules.

On December 28, 1979, 40 days after the second incident referred to, NTSB issued A-79-106 and 107, recommending that FAA expedite establishment of the TCA at San Diego and, in the interim, on an emergency basis (Class I, Urgent Action) impose mandatory reporting and control requirements on all pilots before entering the San Diego TRSA.

FAA indicated in its response of January 7, 1980, that high priority was being given to the regulatory process for establishment of the TCA and that the suggested interim action would likely create such confusion that it might detract from safety, not add to it. A Group II TCA was established at San Diego on March 15, 1980.

The actions, which constitute responses to Class I - Urgent Action recommendations, are the product of indepth study of the problem, and analysis of the air traffic control system, flight operations, airworthiness, or other areas within the purview of FAA regulatory and enforcement authority.

During the first quarter, the FAA also responded to the eight major recommendations of the Board which were developed from the investigation and public hearing arising out of the American Airlines DC-10 accident at Chicago, Illinois, on May 25, 1979 (A-79-98 through A-79-105).

The second quarterly report will be published in July 1980. The Class I-Urgent Action recommendations that the FAA has responded to during the second quarter, CY-80, will be discussed, as well as such other issues that may be appropriate at that time.

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: October 10, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-79-73 and -74

The National Transportation Safety Board's investigation of the midair collision involving Pacific Southwest Airlines Flight 182, a Boeing 727, and N7711G, a Cessna 172, at San Diego, California, on September 25, 1978, revealed that the air carrier's flightcrew probably was not aware of the full extent of its responsibility after accepting a maintain-visual-separation clearance. Because of the cooperative nature of the air traffic control (ATC) system, the Safety Board is concerned that there may be a lack of understanding on the part of pilots regarding the relationship of their responsibility and the responsibility of the air traffic controller when a pilot accepts a maintain-visual-separation clearance.

While the Board believes the AIM adequately describes the interrelationship of pilot and controller roles and responsibilities, we further believe all pilots should be tested recurrently on pilot/controller interrelationships and responsibilities as outlined in the AIM.

A way to address this issue might be for the requirements of 14 CFR 61.57, "Recent Flight Experience: Pilot in Command," to be expanded expressly to include a review of ATC procedures, and for 14 CFR 121, "Appendix F - Proficiency Check Requirements," to be expanded expressly to include a similar review.

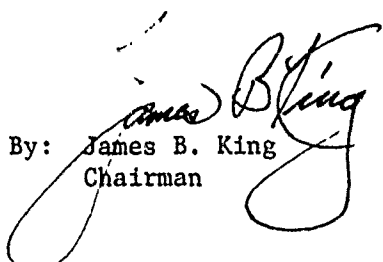
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Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Prescribe an appropriate method to do so and require all air carrier companies and commercial operators to test their pilots recurrently on ATC radar procedures, radar services, pilot/controller relationships, and ATC clearances. (Class-II, Priority Action) (A-79-73)

Prescribe a method to insure that all general aviation pilots are tested periodically on ATC radar procedures, radar services, pilot/controller relationships, and ATC clearances as appropriate to their operations. (Class-II, Priority Action) (A-79-74)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in the above recommendations.

By:  James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

January 8, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, S. W.
Washington, D. C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendations A-79-73 and 74 issued on October 10, 1979. These recommendations are based on the Board's concern that there may be a lack of understanding on the part of pilots regarding the relationship of their responsibility and the responsibility of the air traffic controller when a pilot accepts a "maintain visual separation" clearance. The Board stated in its forwarding letter that it believes the Airman's Information Manual (AIM) adequately describes the interrelationship of pilot and controller roles and responsibilities, but believes that all pilots should be tested recurrently on those responsibilities and relationships as outlined in the AIM. The following are the Federal Aviation Administration's comments and actions in response to these recommendations.

A-79-73. Prescribe an appropriate method to do so and require all air carrier companies and commercial operators to test their pilots recurrently on ATC radar procedures, radar services, pilot/controller relationships, and ATC clearances.

Comment. We agree it is essential that pilots be aware of their roles and responsibilities when they accept a "maintain visual separation" clearance. However, we believe that we have adequate control of air carrier and commercial operators' training programs through the principal operations inspectors (POI) assigned to the individual operators. We propose to issue appropriate bulletins requesting the POI's to ensure that interrelationships of the pilot and controller roles and responsibilities are covered in each operator's recurrent training program. We plan to have these bulletins issued by the end of March 1980.

A-79-74. Prescribe a method to ensure that all general aviation pilots are tested periodically on ATC radar procedures, radar services, pilot/controller relationships, and ATC clearances as appropriate to their operations.

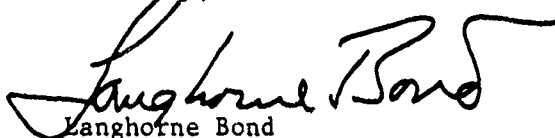
Comment. 14 CFR 61.57, "Recent Flight Experience: Pilot in Command," presently includes language which provides for a flight review, including ATC procedures, which, we believe, adequately covers the pilot/controller relationships while still providing the flexibility to the person giving the review to deal with the pilot's individual needs. Paragraph 61.57 (b) states that a flight review consists of a review of the current general operating and flight rules of Part 91, and a review of those maneuvers and procedures which in the discretion of the person giving the review are necessary for the pilot to demonstrate that he can safely exercise the privileges of his pilot certificate.

This individual treatment is further emphasized by industry guidance material on the Biennial Flight Review (BFR) such as that published in the enclosed excerpt from a publication by the National Association of Flight Instructors widely used for the conduct of BFR's by flight instructors.

Our Office of Flight Operations will work with the Air Traffic Service in developing a presentation to be used in the Accident Prevention Program that will educate the general aviation pilots on radar services that are available and will discuss pilot/controller relationships and ATC clearances for pilots operating under visual flight rules.

In the absence of additional information indicating a significant shortcoming in general aviation pilot/controller relationships, we believe that the current regulations provide a satisfactory level of regulation and flexibility to permit the intent of this recommendation to be accomplished.

Sincerely,


Langhorne Bond
Administrator

Enclosure

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: October 17, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-80 and -81

The air taxi industry, particularly the commuter air carrier segment, has enjoyed tremendous growth in recent years. U.S. commuter airlines have gained an average of 10 percent more passengers and 30 percent more freight each year since 1970. Commuter air carrier revenue passenger miles have increased from 750,048,000 in 1975 to 1,145,000,000 in 1978. The FAA has forecast a 116 percent increase in commuter passenger enplanements between fiscal 1978 and 1989. This forecast growth of the air taxi industry has prompted aircraft manufacturers to produce new and larger aircraft.

However, this expansion has been accompanied by a corresponding rise in commuter air carrier accident fatalities. For example, in the first 7 months of 1975 there were 27 commuter air carrier accidents which included 9 fatal accidents and 24 fatalities. During the first 7 months of 1979 there have been 27 commuter air carrier accidents including 10 fatal accidents and 48 fatalities.

In the past 2 years, the National Transportation Safety Board has investigated numerous commuter accidents in which the aircraft was at or above its maximum certificated gross weight or at or beyond its center of gravity (c.g.) envelope, or both ^{1/}. In all of these accidents, pilots were confronted with the two-fold problem of unfavorable weight and balance and mechanical malfunction. Safety Board investigations of

- 1/ Aircraft Accident Report: Rocky Mountain Airways, DHC-6, Cheyenne, Wyoming, February 27, 1979. (NTSB-AAR-79-10)
Aircraft Accident Report: Columbia Pacific Airlines, Beech 99, Richland, Washington, February 10, 1979. (NTSB-AAR-78-15)
Aircraft Accident Report: Antilles Air Boats, G-21A, St. Thomas, Virgin Islands, April 5, 1978. (NTSB-AAR-79-9)

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these accidents also revealed that the pilots had received no flight or ground training on the performance capabilities and handling qualities of the aircraft when loaded to its maximum certificated gross weight or at the limits of its c.g. envelope.

On March 1, 1979, a commuter air carrier flight, a Beech Model 70, Excalibur conversion, crashed during takeoff at the Gulfport-Biloxi Regional Airport, Gulfport, Mississippi. The investigation revealed that the aircraft was over its maximum certificated gross weight, and out of its c.g. envelope. It also revealed uncorrected maintenance discrepancies, that the ADF and wing flaps were inoperative, and that the starter interrupt system had been bypassed. Further, it revealed that aircraft dispatch operations were hurried and that, in particular, data for weight and balance computations were carelessly compiled. Moreover, the pilot had received no training on the performance capabilities and handling qualities of the aircraft under high gross weight conditions. The accident illustrates a typical result of poor operational practices and incomplete training. The pilot had flown the aircraft earlier that day at its maximum weight for the first time even though it was on a regularly scheduled, unsupervised passenger flight.

Safety Board investigative experience has disclosed also that air taxi/commuter flights are often conducted at high gross weights. Many of the aircraft used by these operators exhibit flight characteristics and handling qualities at high gross weights that are markedly different from those exhibited at lower gross weight.

While it may be impractical to accomplish flight training in aircraft loaded to the maximum gross weight or at the limits of the c.g. envelope, all pilots should be thoroughly familiar with the performance deficiencies which could be produced by such conditions and have training under conditions approaching these limits. Such performance deficiencies may include an increase in takeoff speed, a longer takeoff roll, a reduction in the rate and angle of climb, and a higher stall speed. These deficiencies may be compounded further by an aircraft malfunction, such as an engine failure. Training regarding these factors would have alerted the pilot in the Gulfport accident to the importance of proper weight and balance for safe flight and he might have required accurate computations to be made.

The Safety Board is aware that the Federal Aviation Administration is currently evaluating comments on NPRM 78-3, "Flight Crewmember Flight and Duty Time Limitations and Rest Requirements," as they apply to 14

CFR 121 operations. However, recent commuter air carrier accidents have given added urgency to the need to revise the crew duty time, flight time, and rest period regulations contained in 14 CFR 135 2/.

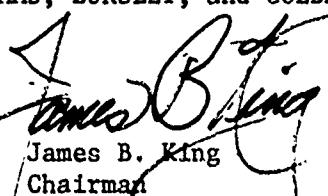
The Safety Board believes that the expansion of 14 CFR 135 operations, and particularly commuter air carrier operations, to more closely approximate those of air carriers certificated under 14 CFR 121, should be accompanied by measures to assure a comparable level of safety. Differences in the types of operational activities usually conducted by a commuter air carrier pilot are other factors which support a need for such changes. Commuter air carrier flights are usually short, and during a long-duty day a pilot can be required to make numerous approaches and landings, and numerous instrument approaches -- often conducted as single pilot IFR operations. The commuter air carrier pilot may be required to perform collateral duties such as baggage handling and aircraft refueling. These factors can all contribute to pilot fatigue, with a possible resultant deterioration of basic flying skills and judgment.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require that pilots involved in 14 CFR 135 operations be thoroughly trained on the performance capabilities and handling qualities of aircraft when loaded to their maximum certificated gross weight or to the limits of their c.g. envelope, or both. (Class-II, Priority Action) (A-79-80)

Expedite rulemaking which would make the flight time and duty time limitations, and rest requirements for commuter air carriers the same as those specified for domestic air carrier crewmembers under 14 CFR 121. (Class-II, Priority Action) (A-79-81)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, BURSLEY, and GOLDMAN, Members, concurred in these recommendations.

By:  James B. King
Chairman

2/ Aircraft Accident Report: Universal Airways, Beech 70, Gulfport, Mississippi, March 1, 1979. (NTSB-AAR-79-16)
Aircraft Accident Report: Columbia Pacific Airlines, Beech 99, Richland, Washington, February 10, 1978. (NTSB-AAR-78-15)
Air New England, DHC-6, Yarmouthport, Massachusetts, June 17, 1979. (Currently under investigation)

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20590



OFFICE OF
THE ADMINISTRATOR

January 15, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, S.W.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendations A-79-80 and 81 issued on October 17, 1979. These recommendations are based on the Board's concern that the expansion of 14 CFR 135 operations, and particularly commuter air carrier operations, be accompanied by measures to assure a level of safety comparable with that of the air carriers certificated under 14 CFR 121. These recommendations would deal with certain aspects of pilot training and with crew flight time, duty time, and rest requirements. The following are the Federal Aviation Administration's (FAA) comments and actions in response to these recommendations.

A-79-80. Require that pilots involved in 14 CFR 135 operations be thoroughly trained on the performance capabilities and handling qualities of aircraft when loaded to their maximum certificated gross weight or to the limits of their c.g. envelope, or both.

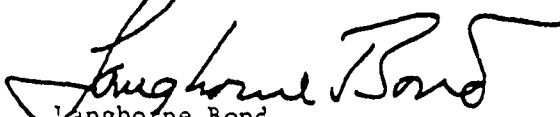
Comment. The FAA is in the process of amending Part 135 to require operating experience similar to that required in Part 121 for any pilot prior to designation as pilot-in-command on commuter air carrier operations. This operating experience would expose the pilot to various gross weight operations for each make and model aircraft to be flown. This operating experience will be acquired under the supervision of a company check pilot. The estimated completion date for this regulatory action is March 1, 1980.

In addition, we are issuing a directive that will be more specific as to testing standards regarding pilots as stated in Part 135. Although present training and testing requirements cover aircraft performance, this additional directive will cover this area in more detail. Estimated completion date for this directive is February 1, 1980.

A-79-81. Expedite rulemaking which would make the flight time and duty time limitations, and rest requirements for commuter air carriers, the same as those specified for domestic air carrier crewmembers under 14 CFR 121.

Comment. Considerable work has been done on amending the present flight and duty time requirements for both 14 CFR 135 and 14 CFR 121 to provide compatible requirements. The final draft of the Notice of Proposed Rule Making does provide for identical requirements for Parts 135 and 121. The Supplemental Notice of Proposed Rule Making, Notice No. 78-3E, on this subject, should be issued by the end of March 1980.

Sincerely,

A handwritten signature in cursive script, reading "Langhorne Bond".

Langhorne Bond
Administrator

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

ISSUED: October 30, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-82 through -84

About 2020 e.s.t., on September 8, 1977, Champion Home Builders Company, Gates Learjet 25B, N999HG, crashed shortly after takeoff at Sanford, North Carolina. All five persons aboard were killed, and the aircraft was destroyed.

The aircraft departed Sanford Airport about 2018 e.s.t., for a flight to Flint, Michigan. In accordance with departure instructions from Fayetteville departure control, the flight was about 3 mi west of the airport, climbing through 3,000 ft, on a heading of 270°, when it disappeared from radar. There were no distress calls, but several witnesses west of the airport saw the aircraft on fire below the 600-ft overcast ceiling. The flight completed a right turn to a northeasterly heading and suddenly dove to the ground. Persons in the immediate vicinity reported that the aircraft was on fire before it crashed.

The Safety Board determined that the probable cause of this accident was one or more low-order explosions in the aircraft's aft fuselage which resulted in a fire and loss of control capability. The Safety Board could not determine conclusively the fuel and ignition sources of the initial explosion; however, gases from the aircraft's batteries or fuel leakage from fuel system components, or both, could have been present in the area of the initial explosion. The Safety Board believes that the evidence uncovered by its investigation relating to the ventilation of aircraft batteries and tailcone areas of this and possibly other corporate-type jets merits dissemination throughout the industry.

When an aircraft engine is started by aircraft battery power and, as in this case, the aircraft is equipped with Nickel Cadmium (NiCad) batteries, and the batteries are recharged, they generate hydrogen gas. The amount of gas generated depends on the condition of the batteries. Normally, this gas is vented overboard to prevent a dangerous collection of gas within the aircraft. Venting of the battery system depends on hoses attached to overboard vents, and venting of the tailcone system depends primarily on ram air entering the top of the tailcone and exiting through a bottom fuselage opening. Ground operation of an aircraft with no airflow through the tailcone or taxiing with a tailwind could preclude adequate ventilation.

2747-A

On the Gates Learjet airplane involved in this accident, the vent hoses to one side of each battery case were not connected and the venting of this gas overboard depended on air pressure in the battery ventilation and tailcone ventilation systems developed by the movement of the aircraft.

The Safety Board was not able to determine why the hoses were not connected. The Safety Board is aware of 14 CFR 23.1353 and 25.1353 requiring measures to preclude explosive gases emitted by a battery accumulating in hazardous quantities within the aircraft. Following the start of one engine, with the aircraft's battery, the absence of the vent hoses may have permitted hydrogen gas to enter the tailcone of the aircraft. After the engine start, the aircraft taxied downwind. This would have limited the ventilation of the tailcone and could have allowed hydrogen gas from the recharging battery to collect in a confined area.

The Safety Board believes that sufficient hydrogen gas could have been generated to provide a flammable or explosive mixture. This mixture may have ignited as it was drawn overboard past the air conditioning motor. Although classified as explosion-proof, the brush end of the air conditioning motor showed evidence of explosive distortion as did the air plenum chamber through which tailcone air passes en route overboard.

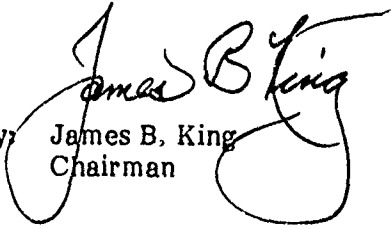
In view of the above, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Advise appropriate personnel to be particularly cognizant during aircraft certification of the provisions for battery ventilation to insure that (1) adequate ventilation is provided during all conditions of ground and flight operations, (2) vent system design precludes inadvertent or maintenance-related removal of essential elements, and (3) batteries and the battery ventilation systems are isolated from all possible ignition sources about the aircraft. (Class II, Priority Action) (A-79-82)

Prepare and issue an Advisory Circular to all owners/operators of aircraft equipped with NiCad batteries to stress the necessity of an inspection of the battery ventilating system during preflight inspections. (Class II, Priority Action) (A-79-83)

Emphasize to maintenance personnel and FAA inspectors, through appropriate FAA publications, the hazards that can result from improperly installed battery ventilation systems. (Class II, Priority Action) (A-79-84)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.

By: 
James B. King
Chairman



National Transportation Safety Board

Washington, D.C. 20594

February 25, 1980

Office of
Chairman

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D. C. 20591

Dear Mr. Bond:

Thank you for your letter of January 28, 1980, responding to the National Transportation Safety Board's Safety Recommendations A-79-82 through A-79-84. These recommendations stemmed from our investigation of a Gates Learjet 25B crash which occurred shortly after takeoff at Sanford, North Carolina, on September 8, 1977. The recommendations pertained to the installation, ventilation, and maintenance of NiCad batteries.

The Safety Board's comments on the Federal Aviation Administration's (FAA) response are as follows:

A-79-82. The FAA's letter AWS-130 of December 21, 1979, addressed to all FAA staff concerned, with a copy of the Safety Board's recommendation enclosed, fulfills the intent of this recommendation, which is now placed in a "closed - acceptable action" status.

A-79-83 and 84. These recommendations are being maintained in an "open - acceptable action" status pending the FAA's issuance of Advisory Circular 43-16. We trust that the maintenance notes section of AC 43-16 will include the necessity for properly installed battery ventilation systems.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "James B. King", written over a large, stylized circular flourish.

James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

January 28, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, S.W.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendations A-79-82 through A-79-84 issued by the Board on October 30, 1979. These recommendations resulted from the Board's investigation of a Gates Learjet 25B crash shortly after takeoff at Sanford, North Carolina, on September 8, 1977.

The Board stated in its October 30, 1979, recommendation letter to the Federal Aviation Administration (FAA) that the probable cause of this accident was one or more low-order explosions in the aircraft's aft fuselage which resulted in a fire and loss of control capability. The Board concluded that gases from the aircraft's batteries or fuel leakage from fuel system components, or both, could have been present in the area of the initial explosion. The Board believes that the evidence uncovered by its investigation relating to the ventilation of aircraft batteries and tailcone areas of this and possibly other corporate-type jets merits dissemination through the industry.

The following are the FAA's comments and actions in response to these recommendations:

A-79-82. Advise appropriate personnel to be particularly cognizant during aircraft certification of the provisions for battery ventilation to insure that (1) adequate ventilation is provided during all conditions of ground and flight operations, (2) vent system design precludes inadvertent or maintenance-related removal of essential elements, and (3) batteries and the battery ventilation systems are isolated from all possible ignition sources about the aircraft.

Comment. All Regional Flight Standards Engineering & Manufacturing Branch Chiefs have been alerted to this accident and its probable cause by means of a letter which transmitted a copy of the subject recommendation. A copy of the December 21, 1979, FAA letter is enclosed. We believe that the October 30, 1979, NTSB recommendation letter best expresses the Board's concerns in these subject areas.

A-79-83. Prepare and issue an Advisory Circular to all owners/operators of aircraft equipped with NiCad batteries to stress the necessity of an inspection of the battery ventilating system during preflight inspections.

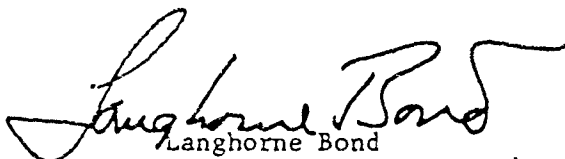
Comment. Battery ventilation system integrity is a design and maintenance function rather than an item to be included in a pilot's preflight inspection. The probability of a vent hose becoming detached between maintenance or periodic inspection intervals is extremely remote. Maintenance Advisory Circular information is covered in our response to NTSB Recommendation A-79-84 below.

A-79-84. Emphasize to maintenance personnel and FAA inspectors, through appropriate FAA publications, the hazards that can result from improperly installed battery ventilation systems.

Comment. Battery ventilation is covered in the two volumes of Advisory Circular AC 43.13, Acceptable Methods, Techniques and Practices. AC 43-13-1A, Inspection and Repair, emphasizes checking lead acid battery venting systems and reiterates the need when Nickel Cadmium (NiCad) batteries are used to replace lead acid types. AC 43.13-2, Aircraft Alterations, further emphasizes suitable battery compartment venting by stating airflow rates considered adequate. Copies of the appropriate sections of the ACs are enclosed.

To further emphasize the necessity for properly installed battery ventilation systems, FAA plans to include in the Maintenance Notes section of a future issue of AC 43-16, General Aviation Airworthiness Alerts, a reminder of the importance of this installation.

Sincerely,


Langhorne Bond
Administrator

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: November 19, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-85

On April 18, 1979, a Sikorsky S-61L helicopter crashed at Newark International Airport, Newark, New Jersey. The Safety Board determined that the probable cause of the accident was the separation of the tail rotor assembly and gearbox from the aircraft at an altitude which made further controlled flight impossible. The rotor assembly and gearbox separated because of severe vibrations in the rotor assembly which were induced by the loss of a tail rotor blade due to fatigue failure. Metallurgical examination of the blade's spar revealed a fatigue fracture across 90 percent of its cross section 35 inches from the outboard end. The blade is designed and manufactured so that the spar is completely enclosed in an aluminum skin envelope, thereby making visual inspection of the spar impossible.

The Sikorsky S-58 model helicopter uses a tail rotor blade identical in design to the S-61L model blade, although dimensionally it is smaller in the spanwise direction. The Board learned that one tail blade spar failure has occurred recently on an S-58T model helicopter in South America. Loss of a section of blade on the S-58 results in the same conditions that occurred on the S-61L at Newark, New Jersey.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue an Airworthiness Directive to require a one-time ultrasonic inspection of tail rotor blades installed on S-58 and S-58T model helicopters for evidence of spar cracks and, if necessary, establish a recurring spar inspection based on an appropriate number of operating hours.
(Class I, Urgent Action) (A-79-85)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.

By: 
James B. King
Chairman

17/18

2635-C

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

February 15, 1980

Honorable James B. King
Chairman, National Transportation Safety Board
800 Independence Ave., S.W.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to NTSB Recommendation A-79-85 issued by the Board on November 19, 1979, regarding Sikorsky S-58 and S-58T model helicopters. The recommendation resulted from the Board's investigation of a Sikorsky S-61L helicopter crash at Newark International Airport, Newark, New Jersey, on April 18, 1979.

Recommendation A-79-85. Issue an Airworthiness Directive to require a one-time ultrasonic inspection of tail rotor blades installed on S-58 and S-58T model helicopters for evidence of spar cracks and, if necessary, establish a recurring spar inspection based on an appropriate number of operating hours.


Comment. We do not concur with this recommendation for the following reasons:

1. We do not believe that an Airworthiness Directive should be issued based on similarity of design because the loads and stresses imposed on the S-58 tail rotor blades are less than those for the S-61 helicopter.
2. Service difficulty reports on the S-58 tail rotor blades do not indicate that an unsafe condition exists. The only indication of a possible fatigue failure of a tail rotor blade that we have received was based upon the outboard section of a blade found in the sea after the helicopter had capsized. We have no information on the inspection or maintenance of the tail rotor or information on whether or not there was foreign object damage of the blade. This report is the only indication of a possible fatigue failure of the spar in over 20 years of service.

2

3. Tail rotor blades, because they are likely to be struck by debris thrown up by the main rotor air flow and because they are turning rapidly, are subject to foreign object damage. Sikorsky has issued service bulletins to specify and to emphasize daily visual and, if a crack is suspected, dye penetrant inspections of the S-58 tail rotor blades.

Sincerely,


Langherne Bond
Administrator

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: November 15, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-86 and -87

On March 3, 1979, a Beech Travel Air, N644SE, crashed into mountains east of Elko, Nevada, killing all four persons aboard. The flight was on an instrument flight rules (IFR) flight plan and was under the control of the Salt Lake City Air Route Traffic Control Center (ARTCC). Shortly after the pilot reported to the ARTCC that he was leaving 13,000 feet for 14,000 feet, the aircraft developed problems with its left engine. The highest altitude the aircraft reached was 13,200 feet, at which point the pilot initiated a descending turn to the left. When the aircraft reached 11,600 feet, the pilot declared an emergency to Salt Lake City ARTCC and turned toward Elko, Nevada.

When the aircraft was at 10,800 feet, the controller transmitted, "...suggest you make a left turn and proceed eastbound from your position. There is a mountain range 12 o'clock and about 2 miles, ten eight on the altitude." When the controller suggested the turn, however, based on a mental correlation of terrain information from an overhead map with the display on his radar scope, the aircraft was already past the highest terrain along its projected track and the elevation of the terrain immediately ahead was between 5,000 and 6,000 feet. Nevertheless, the pilot made the turn to the left and the aircraft crashed into the mountain at the 9,400 foot level. The Safety Board believes that the controller was faced with an extremely difficult task in making a mental correlation of the two sources of information.

The Safety Board also believes that if an Emergency Obstruction Video Map, which displays contour lines and terrain elevation information, had been installed in the Salt Lake City ARTCC, the controller would have known precisely where the mountain range was located in relation to the aircraft, and hence would not have issued the suggested heading. The pilot would then have continued descent to the aircraft's single-engine service ceiling of 7,900 feet and proceeded toward Elko, Nevada.

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In view of the foregoing and other accidents that it has investigated, the Safety Board believes that the use of the Emergency Obstruction Video Map, as outlined in paragraph 1481 of the Facility Management Handbook, should be expanded to include every ATC facility controlling airspace over designated mountainous areas.

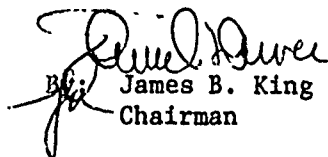
Currently, this type of map is being used at the terminal radar facilities in Seattle, Washington, and Tucson, Arizona, and other terminal facilities are equipped to accommodate the addition of this feature at small cost.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require all terminal facilities located in designated mountainous areas to install and use emergency obstruction video radar maps. (Class II, Priority Action) (A-79-86)

Design future ARTCC NAS Stage-A radar systems to include the capability of incorporating emergency obstruction video maps and require those facilities servicing designated mountainous areas be provided with and use the feature as the new systems are installed. (Class II, Priority Action) (A-79-87)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.


By: James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

February 12, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, S W.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to your letter dated November 15, 1979, concerning NTSB Recommendations A-79-86 and A-79-87.

Recommendation A-79-86. Require all terminal facilities located in designated mountainous areas to install and use emergency obstruction video radar maps.

Comment. We agree in principle with NTSB's recommendation. However, before deciding on adoption, we must determine its impact on our terminal radar facilities (e.g., the loss of an existing video map slot) and the National Ocean Survey's (NOS) personnel resources. It is the latter organization which would be tasked to produce the approximately 60 emergency obstruction video maps (EOVM) that would be required.

You can expect our followup response on this recommendation within 90 days.

Recommendation A-79-87. Design future ARTCC NAS Stage A radar systems to include the capability of incorporating EOVMs and require those facilities servicing designated mountainous areas be provided with and use the feature as the new systems are installed.

Comment. The NTSB refers to the use of an EOVM as outlined in the Facility Management Handbook. However, NAS Stage A does not use a video map--the map is a digitized geographic display.

NAS Stage A has a center map consisting of up to 400 logical maps. There are a maximum of 2,048 words of storage available to design each logical map. Each straight line on a map consists of three words regardless of its length, and each curve on a map consists of many lines. For example, the Chicago Center contoured Lake Michigan on their logical maps and, to achieve this, had to make 1/8-inch line segments. Additionally, the only method of displaying alphanumeric characters on a logical map is through straight lines.

The map selected on an air route traffic control center Plan View Display (PVD) is a logical map. To attempt to display contour lines and terrain elevation information in mountainous areas would be impractical because of the limited amount of storage available (2,048 words per map). Additionally, if it were practical, the map would be highly complex and confusing.

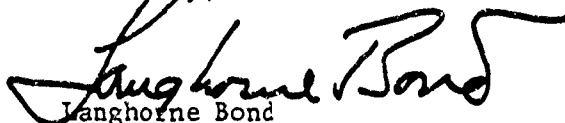
The Denver Center presently has the mountains west of Denver contoured on their displays in the critical climb and descent areas. However, this is in 2,000-foot intervals without elevation information. The elevation information is derived from overhead charts. They attempted to expand on this, but found the displays to be too complex and confusing.

Your staff uses the terminal radar facilities in Seattle, Washington, and Tucson, Arizona, as an example of facilities using an EOVM. The terminal facilities have this capability because the map display is derived from a video mapper, unlike the digitized geographic display used in NAS Stage A radar system.

We are presently developing the En Route Minimum Safe Altitude Warning (E-MSAW) which will be a function of the NAS Stage A computer. E-MSAW will aid the controller by alerting him when a tracked Mode C equipped aircraft is below or is predicted by the computer to go below minimum IFR altitudes as prescribed in FAR Part 91.

In conclusion, we do not believe it feasible, with existing automation resources, to develop an EOVM which displays contour lines and terrain elevations in the NAS Stage A system. Although we believe we are making every effort in this area with the development of E-MSAW, we will, nevertheless, consider an EOVM capability in the design of the next generation en route automation system.

Sincerely,


Langhorne Bond
Administrator

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: November 28, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-88

The National Transportation Safety Board has received information from several owners and operators of Cessna 200 series aircraft that engine turbocharger assemblies are being replaced as the result of foreign object damage to the compressor blades. Examinations of several aircraft indicate a deterioration of the alternate air door's "piano-type" aluminum hinge. As a result, the hinge pin sleeves are breaking away and are being ingested by the turbocharger. FAA's Maintenance Analysis Center records show that 10 such cases have been reported in the past 5 years. Although the Safety Board has not determined that a failure of the hinge has caused an accident, we believe that such a failure does constitute a hazardous condition.

The FAA Engineering and Manufacturing Office at Wichita, Kansas, advised the Safety Board that Cessna changed the material specification of the alternate air door hinge from aluminum to steel and that a production line change was initiated in June 1979 to install the steel hinge on all 200-series aircraft in production. In addition, Cessna has discarded all spare aluminum hinge assemblies.

As of this date, Cessna has not issued any service information regarding the hinge failure problem and its consequence or the corrective action taken to eliminate the problem.

The Safety Board believes that owners and operators of turbocharged 200-series Cessna aircraft should be alerted to the possibility of deteriorated alternate air door hinges. Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

2786

Issue an advisory to owners and operators of Cessna 200 series aircraft, through the General Aviation Airworthiness Alerts (AC-43-16), alerting them to the hazards associated with the aluminum hinge failure problem. The Notice should advise owner/operators to inspect the alternate air door hinge and should include information regarding the availability of new steel hinge assemblies. (Class II, Priority Action) (A-79-88)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in this recommendation.

By  James B. King
Chairman



National Transportation Safety Board

Washington, D.C. 20594

Office of
Chairman

March 21, 1980

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Bond:

Thank you for your letter of February 26, 1980, responding to the National Transportation Safety Board's Safety Recommendation A-79-88 issued November 28, 1979. We recommended that the Federal Aviation Administration:

"Issue an advisory to owners and operators of Cessna 200 series aircraft, through the General Aviation Airworthiness Alerts (AC-43-16), alerting them to the hazards associated with the aluminum hinge failure problem. The Notice should advise owner/operators to inspect the alternate air door hinge and should include information regarding the availability of new steel hinge assemblies."

We note that the March 1980 issue of AC-43-16, General Aviation Airworthiness Alert No. 20, includes an item fulfilling the Safety Board's recommendation. A-79-88 is now classified as "Closed--Acceptable Action."

Sincerely yours,


James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

February 26, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, SW.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendation A-79-88 issued by the Board on November 28, 1979. The Safety Board had received information from several owners and operators of Cessna 200 series aircraft that engine turbocharger assemblies are being replaced as the result of foreign object damage to the compressor blades. The Board's examinations of several aircraft indicated a deterioration of the alternate air door's "piano-type" aluminum hinge. The Board stated that the hinge pin sleeves are breaking away and are being ingested by the turbocharger. Although the Board has not determined that a failure of the hinge has caused an accident, the Board believes that such a failure constitutes a hazardous condition.

Prior to the issuance of the recommendation, the FAA had advised the Board that Cessna changed the material specification of the alternate air door in June 1979 to install the steel hinge on all 200-series aircraft in production. In addition, Cessna has discarded all spare aluminum hinge assemblies.

The Board felt that owners and operators of turbocharged Cessna 200 series aircraft should be alerted to the possibility of deteriorated alternate air door hinges and issued its recommendation to FAA to accomplish that purpose.

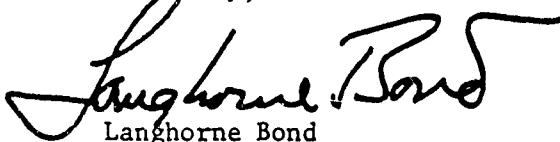
The following are the FAA's comments and actions in response to this recommendation:

A-79-88. Issue an advisory to owners and operators of Cessna 200 series aircraft, through the General Aviation Airworthiness Alerts (AC-43-16), alerting them to the hazards associated with the aluminum hinge failure problem. The Notice should advise owner/operators to inspect the alternate air door hinge and should include information regarding the availability of new steel hinge assemblies.

Comment. The FAA is in full accordance with the Board's recommendation. The March issue of AC-43-16, General Aviation Airworthiness Alerts, which is now at the printers, includes the following item:

"Some operators of turbocharged Cessna 200 series aircraft have experienced problems with ingestion, by the turbocharger, of the hinge pin sleeves from the aluminum "piano-type" hinge of the alternate air door. Operators should be alert to possible deterioration of these hinges, and replace the aluminum hinges with the new steel hinge at the first sign of deterioration."

Sincerely,

A handwritten signature in dark ink, appearing to read "Langhorne Bond". The signature is fluid and cursive, with a large initial "L" and a stylized "B".

Langhorne Bond
Administrator

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.**

ISSUED: December 4, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-89 and -90

The National Transportation Safety Board has been investigating engine malfunctions and failures related to fuel line vapor problems in Cessna 200-series aircraft. The Federal Aviation Administration (FAA) Engineering and Manufacturing District Office (EMDO), which is responsible for oversight of Cessna Aircraft Company, and Cessna Aircraft Company personnel have been fully aware of our concern about this problem for some time. Cessna Aircraft Company recently issued service letters containing checklists and procedures on this subject to operators of Cessna 200-series aircraft. Additionally, the FAA issued an Airworthiness Directive (AD) 79-15-01, effective July 26, 1979, making the provisions of a portion of Cessna's service letters mandatory. Nevertheless, no action has been taken by Cessna or the FAA Central Region to institute hardware changes to correct this problem. The Safety Board is concerned about the lack of timely and adequate corrective action to eliminate fuel system problems that have been identified and believes that the FAA should take immediate action to eliminate the potentially unsafe condition on these aircraft.

The Safety Board's investigation of these Cessna 200-series aircraft engine malfunctions revealed that they frequently are caused by fuel vapor buildup in the aircraft and engine fuel system. Vapor generation in fuel systems is normal, but if it is not properly purged, or if vapor generation becomes excessive, fuel vapor will build up, restrict fuel flow, and may cause intermittent engine operation or complete loss of power. In some cases, the engine-driven fuel pump may cavitate, with an immediate total power loss.

The Safety Board became aware of fuel line vapor problems in the Cessna 200-series aircraft in April 1978, when one of its investigators experienced an engine malfunction while flying a 1974 turbocharged Cessna 210 (T-210). On two occasions, while level at 15,000 feet, the investigator noticed fuel

2785

flow fluctuations and that the fuel flow dropped into the "red arc" 15 to 20 minutes after he switched from the right to left fuel tank. The investigator advanced the mixture to full rich, but there was no change in fuel flow indication, and actuation of the auxiliary fuel boost pump did not change the fuel flow indication appreciably. He noticed rough engine operation, and when he actuated the "maximum" electric fuel boost pump switch, the engine quit. After he released the "maximum" boost pump switch, the engine restarted and he made a safe landing. Apparently, the maximum boost pump purged the fuel vapor but "flooded" the engine.

At that time, the Safety Board believed that the problem with this aircraft was solved by compliance with Cessna Service Letter SE 77-38, dated October 4, 1977. SE 77-38 discussed symptoms similar to those experienced by the Safety Board's investigator. The letter stated that undersize fuel reservoir upper fittings had been installed in some Cessna 200-series aircraft and that the undersize fittings "may allow 'vapor buildup' in the fuel system by restricting purging of fuel vapor to the main tank." SE 77-38 recommended that, if certain fuel flow fluctuation symptoms were experienced, including "intermittent engine operation at altitude," the upper fittings should be inspected for proper size. If found undersize, the fuel reservoir should be replaced.

The left fuel reservoir upper fitting in the T-210 aircraft, in which the Safety Board's investigator encountered the engine problem, was inspected and found to be 0.016 inch undersize. The reservoir was replaced, and no further problems were reported with that aircraft. Review of Service Difficulty Reports and followup with Cessna and the Wichita EMDO revealed that there were several similar occurrences reported by operators which had led Cessna to issue SE 77-38.

During the Safety Board's investigation of a fatal Cessna T-206 accident in July 1978 in which an unexplained engine failure had occurred, we again became concerned about Cessna 200-series aircraft fuel system problems. Both fuel reservoir upper fittings in that aircraft were found to be considerably below specified tolerance. We concluded that fuel vapor buildup, as referenced in SE 77-38, may have caused the engine failure.

Because fuel vapor problems are extremely difficult to document and verify during an accident investigation, the Safety Board requested the Cessna Aircraft Company to test the fuel system in a full scale dynamic mockup of the Cessna 200-series aircraft. The purpose of the proposed test was to demonstrate and evaluate the mechanism of the suspected fuel vapor buildup and determine how the undersize fuel reservoir fittings caused problems.

A full scale fuel system mockup was constructed at Cessna Aircraft Company with various metering devices and transparent fuel supply lines and fuel reservoir. The mockup was considered by all parties to the investigation to be representative of the actual fuel system. The mockup was completed in January 1979, and numerous tests were accomplished in the presence of Safety Board, FAA, and Cessna personnel. Two findings were evidenced by manipulation of the mockup:

(1) During operation of the mockup to simulate various flight and power conditions, fuel vapor generated within the engine fuel system was returned to the reservoir via the engine-driven fuel pump vapor return line. The vapor collected in the upper neck of the reservoir and bubbled upward in the forward fuel supply line, located in the forward door posts, to the main tank, while fuel flowed down to the reservoir through both forward and aft lines, as designed. After an undersize fitting of the smallest dimension found in service was installed on the reservoir neck, vapor bubbles moved up the line to the tank. It was noted that a large bubble tended to hang at the top of the line in a bend where the line became horizontal to facilitate routing to the fuel cell. Apparently, the vapor bubbles lost their buoyancy as they were routed through the various bends and had to travel horizontally toward the fuel cell. Although the vapor bubbles seemed to lose energy en route to the fuel tank, they did in fact reach the tank and were vented overboard.

The findings of this portion of the test determined that an undersize fitting was not the reason for the fuel problems referenced in SE 77-38. When Cessna personnel were asked how they had previously determined that the undersized fittings were the reason for the problems, they replied that the fuel flow fluctuations and engine malfunctions reported by numerous pilots "suggested vapor buildup in the system." They said that undersize fittings were found in some aircraft and they, therefore, "concluded that the fittings were the reason." The Safety Board believes that the engineering evaluation, which was done to support SE 77-38, was inadequate and did not result in suitable corrective action for the reported problems.

(2) Since the reason for the reported fuel flow fluctuations and engine malfunctions had not been determined, further manipulation of the mockup was accomplished. After numerous tests, it was demonstrated that the mere act of switching the fuel tank selector from one tank to another could cause a condition in which fuel vapor was trapped in the reservoir and would eventually build up in the system between the reservoir and engine-driven fuel pump. This significantly reduced the fuel flow.

On certain occasions, when the fuel selector was switched, a surge of fuel started down the forward door post supply line. The fuel coming down the forward door post supply line was a solid column, flowing at the rate of demand required by the engine. The dynamics of the system in this condition were such that the column of fuel perpetuated itself in a "siphon-type" action. The aft supply line remained full of fuel, but no flow occurred. The flow of fuel down the forward supply line was sufficient to overcome the buoyancy of the fuel vapor bubbles and the vapor was trapped in the reservoir. Under these conditions, in 10 to 20 minutes, vapor nearly filled the reservoir and began to build up in the engine fuel system, and the fuel flow slowed. Symptoms of fuel flow fluctuations, similar to those experienced by the Safety Board's investigator and those reported by other pilots of this model aircraft, were evidenced on the metering devices of the mockup. This condition was induced and duplicated several times.

The findings of this portion of the test determined that vapor buildup problems in Cessna 200-series aircraft can be caused, in certain conditions, merely by the switching of fuel tanks. The symptoms occur approximately 10 to 20 minutes after switching fuel tanks. This condition will cause fuel flow fluctuations and may cause cavitation of the engine fuel pump with a subsequent loss of power. The Safety Board believes that the Cessna 200-series aircraft fuel system should be revised to prevent this problem.

The Safety Board is aware that many of the reported fuel flow fluctuation problems and unexplained engine failure/malfunctions in Cessna 200-series aircraft did not occur as a result of fuel tank switching. The Safety Board's investigation into this problem revealed that other design features of the fuel system and certain manufacturing practices can cause conditions conducive to fuel flow fluctuations and engine failure from vapor buildup in the system. Specifically, if excess heat is transmitted to the fuel system, considerable fuel vapor is generated within the system, and under certain conditions, fuel flow fluctuations and engine-driven fuel pump cavitation will occur. On certain turbocharged models, Cessna's manufacturing specifications require at least 1 inch clearance between the fuel line and the exhaust crossover pipe. However, several aircraft have been found, both in service and in production, with a clearance of less than 1 inch. Such proximity to a heat source can cause excessive fuel vaporization.

Routing and restrictions in the lines affect the purging of vapor when liquid is also present in the line. Vapor collects at high points in the line and at restrictions, such as tight bends with reduced tube diameter. During a recent investigation involving an engine failure in a new Cessna P-210, the Safety Board found that the forward fuel supply line from the tank in use had a bend with a radius of less than design specifications and a reduced tube diameter in the bend. In addition, the line was pitched downward between that bend and the fuel tank.

One positive means of eliminating vapor buildup in the aircraft and engine fuel systems is to route a separate vapor return line from the engine-driven fuel pump directly to the appropriate main fuel tank where the vapor will be vented overboard. The present design of the Cessna 200-series aircraft fuel system routes the vapor return line to the reservoir where the vapor must bubble in the forward fuel supply line to the tank. This design feature is not a positive means of venting vapor away and may not be in compliance with the intent of design certification provisions of Civil Air Regulation (CAR) 3.446 or Federal Aviation Regulation (FAR) 23.975 under which the Cessna 200-series aircraft were certificated. These regulations require that carburetors, ^{1/} which are provided with vapor elimination connections, be provided with a vent line which will lead vapors back to one of the aircraft's fuel tanks.

The Safety Board is aware that there is a difference of opinion between the FAA and Cessna regarding the compliance of the Cessna 200-series aircraft with CAR 3.446 and FAR 23.975. Nevertheless, the Safety Board believes that the Cessna 200-series aircraft fuel systems should be modified to prevent the

^{1/} "Carburetor" in this context has been interpreted by the FAA, for design certification purposes, to include fuel injection systems.

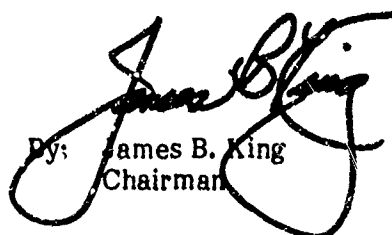
type of vapor problems evidenced. The vapor return line from the engine-driven fuel pump should be routed in a manner so as to provide positive vapor venting into the fuel tank. This is a typical practice in other fuel-injected general aviation aircraft, including twin-engine Cessna aircraft.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require the redesign of the Cessna 200-series aircraft fuel system to incorporate a separate means to route fuel vapor from the pump or reservoir to the fuel tanks, and require the retrofit of the new system on existing Cessna 200-series aircraft. (Class II, Priority Action) (A-79-89)

As an interim measure, issue an Airworthiness Directive to require the inspection of: (1) the forward fuel supply line for proper bend radius and tube diameter in the bend; and (2) the fuel lines inside the engine compartment for proper separation from exhaust system components or other heat sources of all Cessna 200-series airplanes, and the correction of all deficiencies found in those installations. (Class II, Priority Action) (A-79-90)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.


By: James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

March 3, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, SW.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendations A-79-89 and A-79-90 issued by the Board on December 4, 1979. These recommendations resulted from the Board's investigation of engine malfunctions and failures related to fuel line vapor problems experienced in Cessna 200-series aircraft.

FAA's Central Region Engineering and Manufacturing Branch, working directly with Cessna Aircraft Company, has been aware of the facts cited by the Board in its December 4 transmittal letter and has been aggressively pursuing corrective action on this problem with the manufacturer.

The following are the FAA's comments and actions in response to these recommendations:

A-79-89. Require the redesign of the Cessna 200-series aircraft fuel system to incorporate a separate means to route fuel vapor from the pump or reservoir to the fuel tanks, and require the retrofit of the new system on existing Cessna 200-series aircraft.

Comment. Our service records document a vapor return problem on the 1976 through 1979 model year 200-series airplanes, but do not indicate a similar condition on the same models manufactured from 1964 through 1975 having the same vapor return provisions as the later airplanes. This forces us to conclude that the system design concept is not the dominant or pivotal factor in the vapor return problem.

The results of Cessna's flight tests of airplanes with temperature instrumented fuel systems verified by our engineers and flight test pilots, establish that, compared to 1964 through 1975 airplanes, there is an increase in the temperature of fuel/vapor returned to the reservoir tanks in the 1976 and subsequent airplanes. This increase is 9 to 11 degrees Fahrenheit and is sufficient to result in a significantly greater volume of vapor being returned from the engine to the fuel reservoir in these airplanes. This additional vapor, under other conditions conducive to vapor formation, exceeds the vapor handling capability of the system.

The manufacturer established, by a design review and comparison procedure, the design differences contributing to the returned fuel/vapor temperature increase, and then developed design changes to reduce this excessive heat transfer to the supply fuel and return fuel/vapor while it is in the engine compartment. The effectiveness of these changes was verified by flight testing. Basically, the changes add insulation to engine compartment fuel system components, and make some related line rerouting and support changes. The incorporation of these changes on the 1976 through 1979 airplanes lowers the fuel/vapor return temperature 15 degrees Fahrenheit and makes the fuel/vapor return system on these airplanes, from a vapor formation and handling standpoint, equivalent to the pre-1976 model year airplanes.

These modifications have already been incorporated in 1980 model year T210N and P210N airplanes. Cessna Service Kit SK-210-93, covered by Cessna Service Letter SE79-60, dated December 3, 1979 (copy enclosed), makes these modifications available for in-service airplanes. On February 8, 1980, FAA issued Airworthiness Directive 80-04-09 (copy enclosed) which requires these modifications on 1976 through 1979 Cessna Model T210M, T210N, and P210N airplanes.

A-79-90. As an interim measure, issue an airworthiness directive to require the inspection of: (1) the forward fuel supply line for proper bend radius and tube diameter in the bend; and (2) the fuel lines inside the engine compartment for proper separation from exhaust system components or other heat sources of all Cessna 200-series airplanes, and the correction of all deficiencies found in those installations.


Comment. Test results and service reports of which we are aware are inconclusive in establishing that minor system restrictions and tube diameter or bend radii discrepancies of the magnitude believed to exist in airplanes in service are significant factors in the vapor return problem. Our conclusion parallels the Board's statement in its transmittal letter that the findings from a test, accomplished with a full-scale fuel system mockup constructed by Cessna, determined that an undersize fitting was not the reason for the fuel problems addressed in Cessna Service Letter SE77-38, dated October 4, 1977. We conclude that at this time insufficient data or facts exist to credibly support a finding per Federal Aviation Regulation (FAR) 21.99 that the bend radii and tube diameter in the bend are unsafe conditions on in-service airplanes.

Additional fuel line support and increased clearance between engine compartment fuel lines and exhaust system components are provided by an additional bracket in 1980 model year and subsequent airplanes. The bracket is part of Cessna Service Kit SK-210-93 and is required with the installation of the insulation components by Airworthiness Directive 80-04-09.

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We believe the preceding action will correct the deficiencies, which were the concern of NTSB Safety Recommendations A-79-89 and A-79-90, while incurring the least burden on the owner, operator, and the public.

Sincerely,


Langhorne Bond
Administrator

Enclosures

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: November 28, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-91

On September 30, 1979, a West Coast Air Service, Ltd., DeHavilland DHC-6-200 Twin Otter, Canadian Registry C-FWAF, crashed on final approach to Porpoise Bay, British Columbia, Canada. This accident is being investigated by the Aviation Safety Bureau of Transport Canada. A National Transportation Safety Board representative observed the investigation at the invitation of the Aviation Safety Bureau.

During the investigation, the reversing interconnect linkage from the right propeller was found to be disengaged between the propeller reversing push/pull control wire rope terminal (P&WC P/N 3010175)^{1/} and the clevis (P&WC P/N 3012419) interconnect linkage of the right engine. In addition, the reversing interconnect linkage rod and clevis on the aircraft's left engine propeller were found to be attached to the push/pull control wire rope terminal by only one and one-half threads. The engine manufacturer's maximum limit is three threads visible outside the lock nut securing the control rod.

This type of propeller reversing interconnect linkage is installed in some models of the Pratt & Whitney Aircraft of Canada Ltd., PT6-6A,-6B,-6C/20 and -20 series turboprop engines, which are used primarily in a number of models of DeHavilland and Beech aircraft.

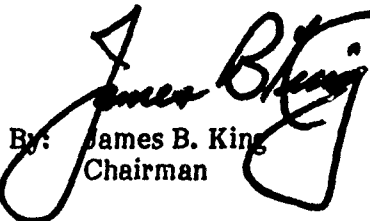
Failure mode analyses by the aircraft manufacturers have shown that if this linkage should fail or become disengaged, under some flight conditions, the propeller can go into reverse pitch. A relatively low airspeed, typical of approach airspeeds, and a mechanical failure or a nullification by the pilot of the beta backup systems will cause the propeller to reverse pitch. Since this sequence would result in a potentially hazardous situation to the aircraft and its occupants, the Safety Board believes that corrective action is required.

^{1/} Pratt & Whitney Aircraft of Canada, Ltd., Illustrated Parts Catalog Part Number.

Therefore, the Safety Board recommends that the Federal Aviation Administration:

Issue an Airworthiness Directive to require a special inspection of the propeller reversing interconnect linkage of all aircraft equipped with Pratt & Whitney Aircraft of Canada Ltd., PT6-6A, 6B, -6C/20 and -20 series turboprop to assure that these installations conform to the aircraft manufacturer's propeller reversing linkage rigging specifications. (Class I, Urgent Action) (A-79-91.)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.


By: James B. King
Chairman



Office of the
Chairman

National Transportation Safety Board

Washington, D.C. 20594

March 21, 1980

Honorable Langhorne Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

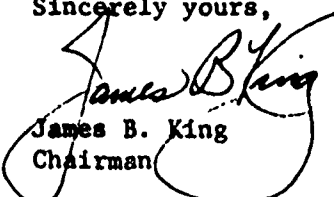
Dear Mr. Bond:

Thank you for your letter dated February 26, 1980, responding to the National Transportation Safety Board's Safety Recommendation A-79-91 issued November 28, 1979. We recommended that the Federal Aviation Administration (FAA):

"Issue an Airworthiness Directive to require a special inspection of the propeller reversing interconnect linkage of all aircraft equipped with Pratt & Whitney Aircraft of Canada Ltd., PT6-6A, 6B, -6C/20 and -20 series turboprop to assure that these installations conform to the aircraft manufacturer's propeller reversing linkage rigging specifications."

The Safety Board is pleased to note that on February 7, 1980, the FAA issued Airworthiness Directive No. 80-04-02 Amendment 39-3693, fulfilling the Safety Board's recommendation. Safety Recommendation A-79-91 is now classified as "Closed--Acceptable Action."

Sincerely yours,


James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

February 26, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, SW.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendation A-79-91 issued by the Board on November 28, 1979. On February 15, 1980, the Board revised the content of its transmittal letter of November 28, 1979, to preclude misinterpretation and to clarify the meaning of one paragraph in the letter. The recommendation itself was not revised.

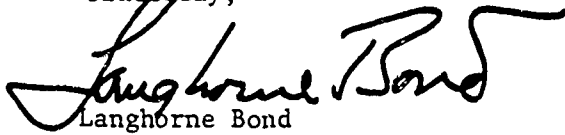
This recommendation resulted from the Board's observations during an investigation of the September 30, 1979, crash on final approach to Porpoise Bay, British Columbia, Canada, of a West Coast Air Service, Ltd., DeHavilland DHC-6-200 Twin Otter. During the investigation, the reversing interconnect linkage from the right propeller was found to be disengaged between the propeller reversing push/pull control wire rope terminal and the clevis interconnect linkage of the right engine. In addition, the reversing interconnect linkage rod and clevis on the aircraft's left engine propeller were found to be attached to the push/pull control wire rope terminal by only 1 1/2 threads. The engine manufacturer's maximum limit is three threads visible outside the lock nut securing the control rod.

The following are the FAA's comments and actions in response to this recommendation:

A-79-91. Issue an Airworthiness Directive to require a special inspection of the propeller reversing interconnect linkage of all aircraft equipped with Pratt & Whitney Aircraft of Canada Ltd., PT-6-6A, -6B, -6C/20 and -20 series turboprop, to assure that these installations conform to the aircraft manufacturer's propeller reversing linkage rigging specifications.

Comment. Airworthiness Directive No. 80-04-02 (copy enclosed), applicable to Pratt & Whitney of Canada Ltd., PT6-6A, -6B, -6C/20 and -20 series engines, was issued February 7, 1980, effective February 8, 1980. The Airworthiness Directive requires an inspection of the propeller reversing interconnect linkage to assure adequate engagement of the push/pull control terminal into the clevis in accordance with the engine manufacturer's recommended installation criteria and the appropriate maintenance manual. The Airworthiness Directive also requires that this inspection be conducted each time that the propeller reversing interconnect linkage is reconnected.

Sincerely,


Langhorne Bond
Administrator

Enclosure

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: November 28, 1979

Forwarded to:

Honorable Langhorne Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-92

On August 18, 1979, a Boeing 737 owned and operated by Wien Air Alaska was involved in a landing accident at Dillingham, Alaska. During the landing roll, the lower attachment bolt for the right main landing gear upper drag strut failed and the landing gear folded rearward causing considerable damage to the aircraft. The National Transportation Safety Board's investigation revealed that the upper drag strut lower attach bolt, PN69-39473-12, had fractured sometime before this landing. During the landing the drag strut pulled through the two halves of the bolt and the gear folded rearward. The cause of the initial fracture has yet to be determined.

As a result of the accident the operator inspected the upper drag strut attach bolts on its aircraft. Initially, the operator borescoped the bolts, but later decided to replace them when it determined that the failure may have been initiated by stress corrosion. During the removal of the bolts from one aircraft, the operator noted that a lower attach bolt had been installed in an upper attach bolt location. The Safety Board is concerned that other upper attach bolts may have been incorrectly installed in the lower attach bolt location which, because of design differences in the bolts, could affect the crashworthiness of the airplane.

The upper and lower bolts are both fuse points in the landing gear, have nearly identical exterior dimensions, and appear to be interchangeable. However, they have differing strengths. The upper attach bolt, PN69-39476-5,6, is manufactured from 4330M (vacuum hardened) steel with a strength of 220 - 235 KSI. The bolt is hollow with an inside diameter of 0.75 inch. The lower bolt is made of 4340M steel with a strength of 270 - 300 KSI and has an inside diameter of 0.50 inch. Both bolts have an approximate outside diameter of 1.5 inches.

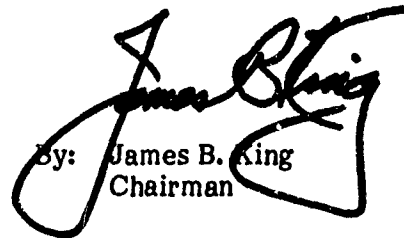
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The selection of these values is significant since the sequence of failure of these bolts when they are overloaded during some accident environments will determine the direction in which the landing gear fails and the subsequent effects on other parts of the aircraft's structure. The use of the higher strength lower attach bolt in the upper "fuse" position may change the breakaway characteristics which were designed into the landing gear to minimize secondary effects of failure, and which were approved in the FAA type certification process.

Therefore, the National Transportation Safety Board recommends the Federal Aviation Administration:

Require an immediate inspection of all Boeing 737 aircraft main landing gear upper drag strut attach bolts to ascertain that the correct bolts are installed in the proper locations. (Class II - Priority Action)
(A-79-92)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in this recommendation.


By: James B. King
Chairman



National Transportation Safety Board

Washington, D C 20594

Office of
Chairman

March 24, 1980

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Bond:

This is in answer to your letter dated February 26, 1980, responding to the National Transportation Safety Board's Safety Recommendation A-79-92 issued November 28, 1979. This recommendation stemmed from the Safety Board's investigation of a Wien Air Alaska Boeing 737 landing accident at Dillingham, Alaska, on August 18, 1979. During the landing roll, the lower attachment bolt for the right main landing gear upper drag strut failed, and the landing gear folded rearward causing damage to the aircraft. We recommended that the Federal Aviation Administration (FAA):

"Require an immediate inspection of all Boeing 737 aircraft main landing gear upper drag strut attach bolts to ascertain that the correct bolts are installed in the proper locations."

We note that:

- a. Boeing Service Letter 737-SL-32-17 dated October 24, 1979, advises of the possibility of having an incorrect bolt installed in place of a fuse bolt;
- b. The maintenance and overhaul manuals have been revised to highlight the correct fuse and structural bolt installations;

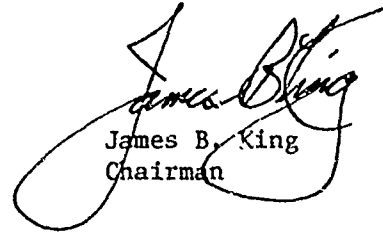
Honorable Langhorne M. Bond

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- c. A design review to establish the feasibility of making the bolts non-mixable has been initiated.

Based on the FAA's conclusions that actions taken by the manufacturer are adequate, A-79-92 is now classified as "Closed--Acceptable Alternate Action."

Sincerely yours,



James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

February 26, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, SW.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendation A-79-92 issued by the Board on November 28, 1979. This recommendation resulted from the Board's investigation of a Wien Air Alaska Boeing 737 landing accident at Dillingham, Alaska, on August 18, 1979.

During the landing roll, the lower attachment bolt for the right main landing gear upper drag strut failed and the landing gear folded rearward causing damage to the aircraft. As a result of the accident the operator inspected the upper drag strut attach bolts on its other aircraft. In its November 28 transmittal letter the Board stated that the operator discovered that in one aircraft, a lower attach bolt had been installed in an upper attach bolt location. The Board became concerned that other upper attach bolts could be incorrectly installed in the lower attach bolt location; and that this might affect the crashworthiness of the airplane. The Board stated that the upper and lower bolts are both fuse points in the landing gear, have nearly identical exterior dimensions, and appear to be interchangeable, but they have differing strengths. The Board expressed its concern that the improper installation of these bolts might change the breakaway characteristics which were designed into the landing gear to minimize secondary effects of failure, and issued its recommendation to require an immediate inspection.

The following are the FAA's comments and actions in response to this recommendation:

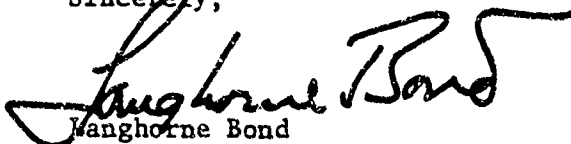
A-79-92. Require an immediate inspection of all Boeing 737 aircraft main landing gear upper drag strut attach bolts to ascertain that the correct bolts are installed in the proper locations.

Comment. FAA's evaluation of this recommendation and the related factors discussed by the Board in its transmittal letter leads to the following conclusions:

- a. Only the upper bolt is a fuse pin.
- b. If the incorrect bolt is installed in the upper lug, the main landing gear beam will translate aft when subjected to an excessive drag load. This would fail the forward trunnion bearing fuse bolt and allow the main landing gear to pull free of the wing.
- c. Breakaway of the gear is expected to be similar regardless of which bolt is installed in the upper lug. The change in breakaway sequence is not critical in the 737 design.

Boeing Service Letter 737-SL-32-17, issued October 24, 1979, addressed the problem of having the upper and lower bolts exchanged and advised operators of this possibility. The FAA does not believe that issuance of an Airworthiness Directive is justified in view of the conclusions detailed above and the action already taken by the manufacturer.

Sincerely,


Langhorne Bond
Administrator

Enclosure:
Boeing Service Letter 737-SL-32-17

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: December 19, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-93

On February 10, 1978, Columbia Pacific Airlines, Flight 23, a Beech 99, crashed during takeoff from the Richland Airport, Richland, Washington. After liftoff, the aircraft climbed steeply to 400 feet above the ground, stalled, and crashed 2,000 feet beyond the end of the runway. The 17 persons on board were killed, and the aircraft was destroyed

The National Transportation Safety Board's investigation 1/ revealed that the aircraft's steep climb was caused by an extreme noseup stabilizer trim position, which the flightcrew did not detect before takeoff. Probably contributing to the crew's failure to recognize the out-of-trim condition were a faulty pitch trim indicator and an inoperative stabilizer out-of-trim warning system. The crew also was not aware that the warning system was inoperative.

On August 11, 1978, the Safety Board issued recommendation A-78-55 which requested the Federal Aviation Administration to change the Beech 99 minimum equipment list (MEL) to require a functional out-of-trim warning system for flight. The FAA rejected the recommendation on the grounds that a visual check of the stabilizer trim is a sufficient safeguard. However, the July 1979 FAA-approved MEL requires the out-of-trim warning system to be operational for flight.

In April 1979, the FAA, in General Aviation Airworthiness Alert No. 9, recommended to Beech 99 and 100 operators that the manufacturer's inspection program be rigidly followed to preclude operating aircraft with inoperative trim indicating/warning systems which could result in an unsafe condition.

1/ Aircraft Accident Report: Columbia Pacific Airlines, Beech 99 Richland, Washington, February 10, 1978. (NTSB-AAR-78-15)

On July 3, 1979, the FAA issued Operations Bulletin No. 79-1 on the Beech 99 stabilizer trim problems and procedures. The Bulletin stressed the need for visual inspection of the stabilizer position during preflight, coordination between crew members regarding their respective responsibilities and duties, and increased emphasis during proficiency flight checks on pilots' knowledge of the stabilizer trim system.

However, this Bulletin, Airworthiness Alert No. 9, and the FAA-approved flight manuals do not require that a crew verify the operational status of the stabilizer out-of-trim warning system. These FAA actions may not preclude a flightcrew from taking off in a hazardous out-of-trim condition.

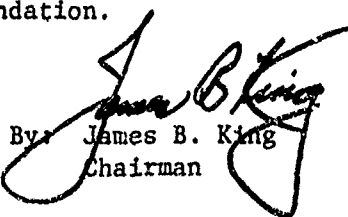
Whenever the stabilizer is not within the takeoff range and the left throttle is advanced past the position that corresponds to the 90 percent N1 setting, the out-of-trim warning system sounds a warning horn. To test the warning system, d.c. electrical power is required but it is not necessary to start either engine.

The Beech 99 and 100 aircraft have almost identical trim and trim warning systems, and neither of the associated FAA-approved flight manuals require the crew to perform a check of the stabilizer out-of-trim warning system. Unless the out-of-trim warning system has been previously "written up" in the aircraft's maintenance forms, the crew has no way of knowing the operational condition of the system. Since the system is required for flight by the minimum equipment list, the crew should also be required to determine the operational status of the system before flight. The manuals require that the trim system be checked, exclusive of the out-of-trim warning system, before the first flight of the day and require an even less comprehensive trim check for quick "turn-around" flights. The manuals do not require a preflight visual inspection of the stabilizer during a quick "turnaround," although Operations Bulletin 79-1 emphasized the importance of a visual check before flight.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require that the Beech 99 and Beech 100 flight manuals include a checklist procedure that requires the crew to verify the operational status of the stabilizer out-of-trim warning system. (Class II, Priority Action) (A-79-93).

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in this recommendation.


By: James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

March 18, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, SW.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendation A-79-93 issued by the Board on December 19, 1979. This recommendation resulted from the Board's investigation of the Columbia Pacific Airlines' Beech 99 crash on February 10, 1978, during takeoff from the Richland Airport, Richland, Washington.

The Board concluded that the aircraft's steep climb was caused by an extreme noseup stabilizer trim position, which the flightcrew did not detect before takeoff. The Board is aware of actions already taken by the FAA and by the manufacturer to prevent a repetition of this accident. However, the Board felt some additional action should be taken, as covered in Safety Recommendation A-79-93.

The following are the FAA's comments and actions in response to this recommendation:

A-79-93. Require that the Beech 99 and Beech 100 flight manuals include a checklist procedure that requires the crew to verify the operational status of the stabilizer out-of-trim warning system.

Comment. A check of the trim warning system before the first flight of the day is a good operating practice. The manufacturer concurs and has agreed to add that item to the checklist which forms a part of the flight manuals for the Beech 99 and Beech 100 airplanes.

We believe that this action meets the objective expressed by the NTSB.

Sincerely,

A handwritten signature in cursive script, reading "Langhorne Bond".
Langhorne Bond
Administrator

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: December 31, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-94 through -97

The National Transportation Safety Board has studied its data files of accidents following engine failures or malfunctions in light twin-engine aircraft (light-twins) that occurred from 1972 through 1976. ^{1/} The complete records of accidents thought to be particularly relevant and enlightening were studied in detail to determine the specific acts of omission or commission by the pilot or deficiencies in the aircraft that led to the acts and why they were not overcome. Pilot or owner handbooks and other materials available to pilots which provide information on engine-out performance and emergency procedures in light-twins were reviewed. These reviews were performed to determine if such information was adequate to enable the pilot to cope with these emergencies. A limited number of interviews were conducted with light-twin pilots, certificated flight instructors, and FAA-designated check pilots to gain some insight into their knowledge, attitudes, and perceptions regarding management of power loss in light-twins.

From 1972 through 1976, there were 477 light-twin accidents following engine failures, 123 of which were fatal, accounting for the loss of 289 lives. The percentage of fatal light-twin accidents following engine failures is more than four times that in single-engine aircraft. Probably contributing to this substantial difference in the percentage of fatal accidents is the considerably higher average cruise speeds, stall speeds, and generally greater weight of the light-twins, resulting in more severe crashes.

The data show that the accident rate in light-twins is much lower in the category involving professional flying than it is for the category involving primarily nonprofessional flying. Also, landing types of accidents are the most prevalent kind of accidents following engine failure; however, they are almost never fatal. Stalls, collisions with the ground or water, and collisions with obstacles account for 92 percent of the fatal accidents following engine failures.

^{1/} For more detailed information read "Special Study--Accidents Following Engine Failures in Light Twin-Engine Aircraft, 1972-1976" (NTSB-AAS-79-2).

There is a relationship between the rate of occurrence of accidents following engine failures in light-twins and the power loading (ratio of gross weight to horsepower) of these aircraft. The Safety Board believes that this relationship should be considered carefully by the FAA in reviewing current airworthiness regulations and when drafting new regulations, especially in regard to 14 CFR Part 135 operations, where the increased use of light-twins for revenue-producing operations presents increased potential for serious consequences. The Safety Board also believes that the general aviation aircraft manufacturers should be cognizant of this apparent relationship when designing new light-twins.

The pilot operating handbooks have been improved over the years and now generally provide most of the information regarding single-engine performance of light-twins and emergency procedures necessary for coping with power loss; however, some of the graphs or charts used to present some performance data in the handbooks are difficult to understand. There is excellent supplemental information in the form of FAA and industry publications and articles presented in the aviation media regarding the hazards of, and the techniques for coping with, power loss in light-twins. The pilot handbooks and supplemental materials which are available are apparently not utilized to the extent necessary for pilots to remain knowledgeable about their aircraft's engine-out performance and the procedures for coping with the emergency.

The pilot total time and time-in-type data suggested that accidents in light-twins following engine failures are not unique to low-time pilots. Further, accidents following engine failures in light-twins generally involve a lack of proficiency in responding to these emergencies. Often these accidents involve some degree of panic, probably related to inadequate immediate recall of the exact emergency procedures or lack of confidence in one's ability to execute the emergency procedures.

It was not possible to assess, in sufficient detail, the precise role of the pilot in these accidents because of the lack of appropriate flight exposure data. The Safety Board concludes that the FAA should begin to collect adequate pilot exposure data.

Based on the results of this study, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Examine pilot handbooks for light twin-engine aircraft to determine if, for certain models, there is a need for any additional explanatory information, especially regarding single-engine performance and normal operation of the aircraft below V_{mc} and provide any such information to all pilots through accident prevention notices or other means at its disposal. (Class II, Priority Action) (A-79-94)

Periodically disseminate to pilots, certificated flight instructors, and FAA inspectors and their designees, additional information on how to manage light twin-engine aircraft following an engine failure, using advisory circulars, safety seminars, or other means at its disposal. (Class II, Priority Action) (A-79-95)

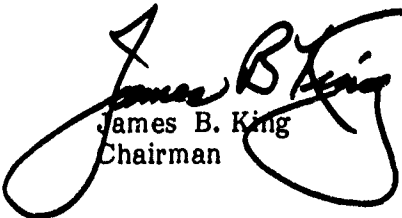
Amend 14 CFR Part 61.57 to require that to act as pilot-in-command of a multiengine aircraft a person must have successfully completed, within the last 24 months, a flight review in a multiengine aircraft. (Class II, Priority Action) (A-79-96)

Amend 14 CFR Part 61.57 to require that during the multiengine flight review, the pilot demonstrate the maneuvers that are required for a multiengine proficiency check in accordance with the flight test guide, especially those maneuvers related to power loss. (Class II, Priority Action) (A-79-97)

The Safety Board also reiterates its recommendation of May 31, 1979, that the Federal Aviation Administration:

Generate, through a stratified sampling of general aviation pilots, the date, duration, aircraft make and model, the geographical location of the flight, and the flight time in IFR, high density altitude, and wind conditions, all on a per flight basis; the data collected should include the pilot's total time, time in each type aircraft flown, age, occupation, certificate, and medical waivers. (Class II, Priority Action) (A-79-44)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in the above recommendations.


James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

March 28, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, SW.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendations A-79-94 through 97 issued by the Board on December 31, 1979. These recommendations were based on a detailed study by NTSB of its data files of accidents following engine failures or malfunctions in light twin-engine aircraft that occurred from 1972 through 1976. Records were reviewed to determine the specific acts of omission or commission by the pilot or deficiencies in the aircraft that led to the acts and why they were not overcome. Handbooks and other materials available to pilots which provide information on engine-out performance and emergency procedures in light twins were reviewed to determine if such information was adequate to enable the pilot to cope with these emergencies.

In its December 31 transmittal letter, the Board stated that pilot-operating handbooks have been improved over the years and generally provide the necessary information regarding single-engine performance. It made reference to excellent supplemental publications by FAA and industry covering the same subject areas.

The Board expressed its concern that these guidance materials are not being utilized to the extent necessary for pilots to remain knowledgeable, and has recommended several actions related to such materials and to pilot flight reviews.

The following are the FAA's comments and actions in response to these recommendations:

A-79-94. Examine pilot handbooks for light twin-engine aircraft to determine if, for certain models, there is a need for any additional explanatory information, especially regarding single-engine performance and normal operation of the aircraft below V_{mc} and provide any such information to all pilots through accident prevention notices or other means at its disposal.

A-79-95. Periodically disseminate to pilots, certificated flight instructors, and FAA inspectors and their designees, additional information on how to manage light twin-engine aircraft following an engine failure, using advisory circulars, safety seminars, or other means at its disposal.

Comment. We have examined pilot handbooks for light twin-engine aircraft and believe there are sufficient single-engine performance data included. There are no data concerning single-engine performance and normal operation of aircraft below Vmc since there cannot be any performance below minimum control airspeed, nor can there be normal operations of aircraft below minimum control airspeed.

We have already taken the actions proposed in these recommendations concerning the dissemination of information on light-twin aircraft. The Accident Prevention Staff has published detailed information on the subject of light-twin operational safety. This information is presented in the articles entitled, "Always Leave Yourself An Out" and "Flying Light Twins Safely." Approximately 100,000 of these articles have been distributed to the field and made available to pilots, flight instructors, designated pilot examiners, and air taxi operators through the Accident Prevention Program. On December 13, 1979, all Accident Prevention Coordinators were asked to conduct safety meetings with air taxi operators on the problem areas discussed in the two articles mentioned above (copies enclosed).

Additionally, the enclosed January 1980 issue of FAA General Aviation News carried an article, "One Engine Out," which provides information on the subject of single-engine performance in light twins. All of the above-referenced publications contain explanatory information not required by aircraft certification regulations, or normally found in manufacturers' pilot-operating handbooks.

Dissemination of the kind of information discussed in these recommendations is an ongoing part of the FAA Accident Prevention Program. Accident Prevention Specialists have been provided with slide/tape presentations on the subject for use in safety meetings and seminars.

A-79-96. Amend 14 CFR Part 61.57 to require that to act as pilot-in-command of a multiengine aircraft a person must have successfully completed, within the last 24 months, a flight review in a multiengine aircraft.

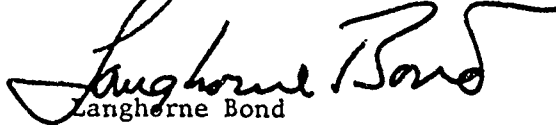
A-79-97. Amend 14 CFR Part 61.57 to require that during the multiengine flight review, the pilot demonstrates the maneuvers that are required for a multiengine proficiency check in accordance with the flight test guide, especially those maneuvers related to power loss.

Comment. We are conducting an internal review of 14 CFR Part 61 to identify areas of potential revision. During this review, we will study the recommended changes to Part 61.57.

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The FAA has included NTSB Recommendations A-79-96 and A-79-97 in the agenda for consideration during the update of 14 CFR Parts 61 and 141.

Sincerely,


Langhorne Bond
Administrator

Enclosures

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: December 21, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-98 through -105

The National Transportation Safety Board has completed its determination of probable cause and final report on the American Airlines DC-10 accident in Chicago on May 25, 1979. The Safety Board's analysis of the evidence, and recommendations submitted to the Board by the other parties who participated in the investigation and public hearing, have identified several areas which we believe require the Federal Aviation Administration's (FAA) early attention. We recognize that the independent studies conducted by FAA following the accident also have identified needed specific actions, and the Safety Board is aware that several actions have already been taken or are anticipated as a direct result of those studies. While the Secretary of Transportation's current overview of the FAA's safety processes and the FAA's institution of a National Resource Specialist Program should generally enhance aviation safety, the Safety Board believes that further attention must be directed specifically toward fairly immediate solutions of some of the apparent deficiencies which led to this accident.

The Safety Board views the DC-10 accident with particular concern because the identified deficiencies touch almost every phase of aviation. First, the deficiencies raise concerns about aircraft design and certification. Putting aside any issue of whether or not the design of the DC-10 engine pylon assembly satisfied all of the structural requirements of the applicable regulations, its vulnerability to critical damage during maintenance apparently was not considered by either the manufacturer's design personnel or the FAA's certification review team. Additionally, the design of the aircraft's systems apparently failed to account for the possibility that a single event could simultaneously render critical portions of the flight control, hydraulic, and electrical systems inoperative. Although singularly, any one of these failures would probably have had little effect on the pilot's ability to fly the aircraft safely, in combination, they presented all but insuperable problems.

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Secondly, the Safety Board is concerned that discrepancies in fabrication unrelated to the Chicago accident found in a number of engine pylons on other DC-10 aircraft can be attributed to deficiencies in the manufacturing and quality control processes of a major airframe manufacturer. That the deficiencies were not detected by the manufacturer shows weaknesses in their quality assurance program and FAA's surveillance of that program. Furthermore, the DC-10 maintenance program established by the Maintenance Review Board permitted these discrepancies to escape detection even after the aircraft had been in commercial service for many years.

Another key problem uncovered in the investigation of this accident is the method through which operators could establish and introduce procedures to conduct major maintenance. Two major U.S. air carriers with extensive maintenance and engineering capabilities were able to introduce the maintenance procedure which led to damage of critical structural elements of DC-10 aircraft. Even though the procedure deviated from that recommended by the airframe manufacturer, apparently neither carrier performed or was required to perform a sufficiently comprehensive review of the procedure to allow it to foresee that the procedure could lead to hazardous damage. Furthermore, the FAA's maintenance inspection program contains no mechanism requiring review and analysis of the operator's maintenance procedures to assure that optimum safety levels are maintained.

It is of special concern that one of the air carriers persisted in using the variant maintenance procedure despite the fact that, on two separate occasions before the Chicago accident, it had discovered damage to the pylon assembly which had been introduced during maintenance. Had more comprehensive communication taken place between the carrier, the manufacturer, and the FAA regarding the damage and how it was being inflicted, action might have been taken which could have prevented the Chicago accident; however, neither incident was brought to the attention of the FAA (nor was it clearly required to be). The manufacturer was notified of the problem because a structural repair was required for which the carrier requested engineering assistance from the manufacturer. While the manufacturer, in a report to other DC-10 operators, included information concerning these incidents, the report which was distributed failed to place any emphasis on the significance of the event. As a result the information was treated routinely by carriers and none sufficiently analyzed the variant maintenance practice to ascertain its potential for causing damage which would affect the structural integrity of the aircraft.

Finally, the Safety Board believes that the operational aspects of this accident involved limitations in the prescribed engine failure procedure. Flight simulation conducted as part of the accident investigation disclosed that the aircraft could have continued to fly if

sufficient airspeed had been maintained, notwithstanding the extensive damage caused by the structural failure of the engine pylon assembly. Successfully flying the aircraft was, however, contingent upon immediate recognition of the need to maintain an airspeed above the procedurally prescribed airspeed schedule--recognition which was inhibited in this accident by the damage itself because it rendered the asymmetric slat and stall warning systems inoperable. The Safety Board questions whether the prescribed procedures were optimal for all conditions and whether they could not have provided for a safer speed margin to cope with unforeseen emergencies without producing intolerable effects on other aspects of the aircraft's performance.

In this accident, the flightcrew was adhering to the prescribed engine failure procedure and corresponding flight director logic which required a climb at the takeoff safety speed (V_2). This speed was approximately 6 knots below the stall speed of the wing on which the leading edge slats had retracted. The aircraft had attained a speed more than 10 knots higher than V_2 when it first became airborne; however, as it decelerated to the target V_2 speed, the left wing stalled without warning resulting in a roll and impact. The Safety Board notes that approved flight manuals for some other aircraft prescribe an engine failure procedure wherein the speed attained in excess of V_2 , up to $V_2 + 10$ knots, is maintained during the climb. The Safety Board believes that the FAA should evaluate and determine the acceptability of the latter procedure as a standard for the industry.

While the overall safety record of the current generation of jet aircraft clearly indicates a basically sound foundation for the regulatory oversight of U.S. commercial aviation and the commitment of the industry to safety, the Safety Board is concerned that this accident may be indicative of a climate of complacency. Although the accident in Chicago on May 25 involved only one manufacturer and one airline, the Safety Board is concerned that the nature of the identified deficiencies in design, manufacturing, quality control, and maintenance and operational procedures may reflect an environment which could involve the safe operation of other aircraft by other carriers.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Incorporate in type certification procedures full consideration of:

- (a) Factors which affect maintainability, such as accessibility for inspection, positive or redundant retention of connecting hardware and the clearances of interconnecting parts in the design of critical structural elements; and

(b) Possible failure combinations which can result from primary structural damage in areas through which essential systems are routed. (Class II--Priority Action) (A-79-98)

Insure that the design of transport category aircraft provides positive protection against asymmetry of lift devices during critical phases of flight; or, if certification is based upon demonstrated controllability of the aircraft under condition of asymmetry, insure that asymmetric warning systems, stall warning systems, or other critical systems needed to provide the pilot with information essential to safe flight are completely redundant. (Class II--Priority Action) (A-79-99)

Initiate and continue strict and comprehensive surveillance efforts in the following areas:

(a) Manufacturer's quality control programs to assure full compliance with approved manufacturing and process specifications; and

(b) Manufacturer's service difficulty and service information collection and dissemination systems to assure that all reported service problems are properly analyzed and disseminated to users of the equipment, and that appropriate and timely corrective actions are effected. This program should include full review and specific FAA approval of service bulletins which may affect safety of flight. (Class II--Priority Action) (A-79-100)

Assure that the Maintenance Review Board fully considers the following elements when it approves an Airline/Manufacturer Maintenance Program:

(a) Hazard analysis of maintenance procedures which involve removal, installation, or work in the vicinity of structurally significant ^{1/} components in order to identify and eliminate the risk of damage to those components;

(b) Special inspections of structurally significant components following maintenance affecting these components; and

^{1/} Structural significant items as defined in Appendix 1 of Advisory Circular 120-17A - "Maintenance Control by Reliability Methods."

(c) The appropriateness of permitting "on condition" maintenance and, in particular, the validity of sampling inspection as it relates to the detection of damage which could result from undetected flaws or damage to structurally significant elements during manufacture or maintenance. (Class II--Priority Action) (A-79-101)

Require that air carrier maintenance facilities and other designated repair stations:

(a) Make a hazard analysis evaluation of proposed maintenance procedures which deviate from those in the manufacturer's maintenance manual and which involve removal, installation, or work in the vicinity of structurally significant components; and

(b) Submit proposed procedures and analysis to the appropriate representative of the Administrator, FAA, for approval. (Class II--Priority Action) A-79-102)

Revise 14 CFR 121.707 to more clearly define "major" and "minor" repair categories to insure that the reporting requirement will include any repair of damage to a component identified as "structurally significant." (Class II--Priority Action) (A-79-103)

Expand the scope of surveillance of air carrier maintenance by:

(a) Revising 14 CFR 121 to require that operators investigate and report to a representative of the Administrator the circumstances of any incident wherein damage is inflicted upon a component identified as "structurally significant" regardless of the phase of flight, ground operation, or maintenance in which the incident occurred; and

(b) Requiring that damage reports be evaluated by appropriate FAA personnel to determine whether the damage cause is indicative of an unsafe practice and assuring that proper actions are taken to disseminate relevant safety information to other operators and maintenance facilities. (Class II--Priority Action) A-79104)

Revise operational procedures and instrumentation to increase stall margin during secondary emergencies by:

(a) Evaluating the takeoff-climb airspeed schedules prescribed for an engine failure to determine whether a continued climb at speeds attained in excess of V_2 , up to $V_2 + 10$ knots, is an acceptable means of increasing stall margin without significantly degrading obstacle clearance.

(b) Amending applicable regulations and approved flight manuals to prescribe optimum takeoff-climb airspeed schedules; and

(c) Evaluating and modifying as necessary the logic of flight director systems to insure that pitch commands in the takeoff and go-around modes correspond to optimum airspeed schedules as determined by (a) and (b) above.
(Class II--Priority Action) (A-79-105)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in the recommendations.


By: James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

March 20, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, SW.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendations A-79-98 through 105 issued on December 21, 1979, based on the Board's determination of probable cause and final report on the American Airlines DC-10 accident in Chicago on May 25, 1979. The Board expressed concern about possible aircraft design and certification deficiencies, and possible deficiencies in the manufacturing and quality control processes of a major airframe manufacturer. Major maintenance procedures, surveillance, and operations procedures were identified by the Board as areas of concern. The following are the Federal Aviation Administration's (FAA) comments and actions in response to these recommendations:

A-79-98

Incorporate in type certification procedures full consideration of:

- (a) Factors which affect maintainability, such as accessibility for inspection, positive or redundant retention of connecting hardware and the clearances of interconnecting parts in the design of critical structural elements; and
- (b) Possible failure combinations which can result from primary structural damage in areas through which essential systems are routed.

COMMENT A-79-98:

Our current type certification procedures include maintenance participation in assessing all areas of the design which are affected by maintenance. We intend to further amend these procedures to assure and emphasize that maintenance specialists, including our National Resource Specialists, will participate in approval of all features of a design which involve maintenance concerns.

COMMENT A-79-98(a):

With regard to maintainability, FAR 25.611 covers the factor of accessibility; FAR 25.607(a) and (b) cover the factor of retention of connecting hardware; and FAR 25.601 and 25.571 cover clearances of interconnecting parts in the design of critical structural elements.

COMMENT A-79-98(b):

Design aspects of failure combinations which can result from primary structural damage in areas through which essential systems are routed are covered by FAR 25.571, 25.601, 25.671, and 25.1309.

A-79-99

Insure that the design of transport category aircraft provides positive protection against asymmetry of lift devices during critical phases of flight; or, if certification is based upon demonstrated controllability of the aircraft under condition of asymmetry, insure that asymmetric warning systems, stall warning systems, or other critical systems needed to provide the pilot with information essential to safe flight are completely redundant.

COMMENT:

Current regulations contain a firm basis to assure positive protection against asymmetry of lift devices during critical phases of flight or the demonstration of adequate warning and controllability of the aircraft during conditions of asymmetry. FAR 25.671, as amended by Amendment 25-23 on April 8, 1970, requires demonstration of continued safe flight and landing after any combination of failures not shown to be extremely improbable. FAR 25.1309 presently requires that all information essential to continued safe flight and landing be provided to the pilot in all cases of failures not shown to be extremely improbable.

A-79-100

Initiate and continue strict and comprehensive surveillance efforts in the following areas:

- (a) Manufacturer's quality control programs to assure full compliance with approved manufacturing and process specifications; and
- (b) Manufacturer's service difficulty and service information collection and dissemination systems to assure that all reported service problems are properly analyzed and disseminated to users of the equipment, and that appropriate and timely corrective actions are effected. This program should include full review and specific FAA approval of service bulletins which may affect safety of flight.

COMMENT A-79-100(a):

A comprehensive revision to Order 8120.2 was published April 30, 1979. This revision places increased emphasis on improved surveillance techniques for safety of flight parts; provides for more effective utilization of inspectors in areas affecting safety; clearly defines the principal inspector's responsibility at assigned manufacturing facilities, expands on process control methods, and other related changes involving improved surveillance methods.

COMMENT A-79-100(b):

The FAA accepts this recommendation and has the following action underway:

(1) Analysis of the regulatory requirements of FAR 21.3, 37.17, 121.703, 121.705, 135.413, 135.415, and 145.163 concerning service difficulty reporting reveals need for revision and a regulatory project is in process.

(2) Upon establishment of adequate regulatory revision, our program of surveillance will be continued with emphasis on amended regulatory requirements.

(3) Also, as you are aware, the FAA has under development, with participation by NTSB, an Aviation Safety Analysis Program in order to implement an improved nationwide safety analysis system. This program includes consideration of service difficulties and the analysis and dissemination of such information.

(4) We have prepared an order to establish revised procedures for FAA approval of manufacturer service documents. This order and associated advisory circular have been prepared in draft form. The advisory circular is scheduled for publication in the Federal Register, in the near future, for public comment.

A-79-101

Assure that the Maintenance Review Board fully considers the following elements when it approves an Airline/Manufacturer Maintenance Program:

(a) Hazard analysis of maintenance procedures which involve removal, installation, or work in the vicinity of structural significant ^{1/} components in order to identify and eliminate the risk of damage to those components;

(b) Special inspections of structural significant components following maintenance affecting these components; and

^{1/} Structural significant items as defined in Appendix 1 of Advisory Circular 120-17A - "Maintenance Control by Reliability Methods."

(c) The appropriateness of permitting "on condition" maintenance and, in particular, the validity of sampling inspection as it relates to the detection of damage which could result from undetected flaws or damage to structurally significant elements during manufacture or maintenance.

COMMENT A-79-101(a) and (b):

Both of these recommendations suggest that the Maintenance Review Board (MRB) function be expanded to include hazard analysis of maintenance functions and special inspections following maintenance of structural components. Thus, the recommendation incorporates the assumption that the MRB is the appropriate place for such functions. Both recommendations also incorporate the assumption that because the FAA approves the overall maintenance program, it also approves each and every maintenance procedure.

The prime function of an MRB is to establish the scope and frequency of inspection; i.e., on condition tests, or other inspection. The following is an excerpt from the MRB document, AC 121.22, which best describes the MRB function:

"PURPOSE. This advisory circular sets forth guidelines to be used in the development and approval of initial maintenance/inspection requirements for air carrier transport category aircraft. These are applicable to newly type certificated aircraft and aircraft powerplants being introduced into service for the first time. Approval of proposed initial maintenance/inspection requirements will be accomplished by a board of FAA specialists, Maintenance Review Board (MRB). All revisions for updating the initial maintenance/inspection requirements will be submitted by an airline/manufacturer committee to the FAA for approval."

The MRB work is completed prior to the aircraft entering into service. The procedures to be utilized by the carriers are not necessarily developed at this time. In fact, at this time, the MRB does not address, or approve, maintenance procedures adopted by an airline. It therefore appears that the MRB is not the place to incorporate such functions.

With respect to the question of approval of maintenance procedures, our statutory and regulatory scheme provides as follows: The Federal Aviation Act, Section 601(b) reflects "the duty resting upon air carriers to perform their services with the highest possible degree of safety." The provisions of FAR 121.363 assign responsibility upon the air carrier for airworthiness of their aircraft. FAR 121.373 requires the air carrier to make continuing analysis of their maintenance programs. The variations necessary in the development of maintenance procedures require that the carrier be held responsible (in accordance with the Act) for the hazard analysis of maintenance practices. Since the MRB function is not to provide the basis for approval of an airline's total maintenance program, there is no reason to include maintenance hazard evaluations or special inspections following maintenance to critical structural components.

Maintenance programs for each airline are reviewed and approved by FAA maintenance inspectors assigned to each carrier. They continually monitor the programs and take corrective action when hazardous maintenance practices are discovered.

COMMENT A-79-101(c):

We agree that emphasis should be placed on assuring that no defects are permitted during manufacture and that damage is not inflicted during maintenance.

"On condition" and "sampling" inspection frequency and procedures are time proven techniques for a properly assembled product or item. We cannot envision how an MRB could have the insight to forecast which structurally significant components would suffer a manufacturing defect or damage due to a maintenance practice. However, the appropriateness of the type of inspection techniques for structurally significant components will be included in the agenda for the Maintenance Steering Group (MSG-3), which has been convened for the purpose of updating the maintenance analysis logic process.

A-79-102

Require that air carrier maintenance facilities and other designated repair stations:

- (a) Make a hazard analysis evaluation of proposed maintenance procedures which deviate from those in the manufacturer's maintenance manual and which involve removal, installation, or work in the vicinity of structurally significant components; and
- (b) Submit proposed procedures and analysis to the appropriate representative of the Administrator, FAA, for approval.

COMMENT A-79-102(a)

Such a requirement is already imposed by the statutory provision of the Federal Aviation Act of 1958. Specifically, Section 605(a), and FAR 121.363 and 135.413 place responsibility directly upon the carriers for maintaining their aircraft in an airworthy condition. Additionally, FAR 121.373 and 135.431 require carriers to perform continuing analysis of their maintenance programs for adequacy. In proper exercise of that responsibility, it is incumbent upon air carriers and repair stations doing work for a carrier to analyze their maintenance practices for possible hazard to structure.

COMMENT A-79-102(b):

Present regulation FAR 121.369(b)(1) requires that the carrier set forth its maintenance procedures in a manual. FAR 121.137 requires that the manual and changes be provided to the FAA. This process does not signify FAA approval of each and every maintenance practice, or procedure, but is one which is designed to ensure that a carrier has clearly set forth its maintenance procedures. It is the duty of the carrier to ensure that these procedures, as part of several aspects of its maintenance program, are appropriate to maintaining the highest possible degree of safety.

A-79-103

Revise 14 CFR 121.707 to more clearly define "major" and "minor" repair categories to insure that the reporting requirement will include any repair of damage to a component identified as "structurally significant."

COMMENT A-79-103:

FAR 121.707 requires reporting when a major repair to a structural area is required. Thus the problem is whether the definition of a major repair, as stated in FAR 1 and 43, is adequate.

The FAA has conducted an analysis of the regulatory definitions set forth in FAR 1 and FAR 43, Appendix A. We have concluded that the present regulation is adequate and no revision is necessary, as explained in our report entitled "DC-10 Decision Basis" dated January 1980. However, an Advisory Circular is in preparation, to emphasize and call attention to the present regulation. The Advisory Circular is in the final coordination for early release.

A 79-104

Expand the scope of surveillance of air carrier maintenance by:

(a) Revising 14 CFR 121 to require that operators investigate and report to a representative of the Administrator the circumstances of any incident wherein damage is inflicted upon a component identified as "structurally significant" regardless of the phase of flight, ground operations, or maintenance in which the incident occurred; and

(b) Requiring that damage reports be evaluated by appropriate FAA personnel to determine whether the damage cause is indicative of an unsafe practice and assuring that proper actions are taken to disseminate relevant safety information to other operators and maintenance facilities.

COMMENT A-79-104(a):

We accept the recommendation and have a regulatory project in process that will amend FAR 121.703 and 135.413 to include maintenance induced damage, as stated above in response to NTSB Recommendation A-79-100(b).

COMMENT A-79-104(b):

When the regulatory project identified in A-79-104(a) above is completed, appropriate FAA review procedures for damage reports will be established. Of course, such a procedure currently exists for all damage reports presently received under existing regulations and procedures.

A-79-105

Revise operational procedures and instrumentation to increase stall margin during secondary emergencies by:

- (a) Evaluating the takeoff-climb airspeed schedules prescribed for an engine failure to determine whether a continued climb at speeds attained in excess of V_2 , up to $V_2 + 10$ knots, is an acceptable means of increasing stall margin without significantly degrading obstacle clearance.
- (b) Amending applicable regulations and approved flight manuals to prescribe optimum takeoff-climb airspeed schedules; and
- (c) Evaluating and modifying as necessary the logic of flight director systems to insure that pitch commands in the takeoff and go-around modes correspond to optimum airspeed schedules as determined by (a) and (b) above.

COMMENT A-79-105(a):

The FAA has initiated positive action in this regard. The Western Region conducted an evaluation of a representative sample of current jet transport aircraft to determine if the maintenance of a speed between V_2 , and $V_2 + 10$ knots, if already attained at the time of engine failure, would increase the stall margin without infringing on takeoff flightpath requirements. A conclusion reached was that this concept has merit for selected aircraft, such as the DC-10, in certain flight conditions and the appropriate changes are being incorporated

into the Airplane Flight Manuals. However, it is not possible to make a general policy statement applicable to all air carrier aircraft without an extensive study of the takeoff performance and characteristics of each model of every aircraft in various configurations. FAA regions with certification responsibility for air carrier turbojet aircraft are being asked to evaluate each make and model of aircraft within their respective purview to provide data pertinent to the recommendation. Specific FAA actions will derive from a meeting of our Flight Standardization Policy Board (FSB) (established to provide standardization of training and checking airmen for each type of aircraft). The Flight Standardization Policy Board is scheduled to meet in April of 1980.

COMMENT A 79-105(b):

The FAR do not require the determination of optimum performance, but do require that certain performance criteria are met. Takeoff speeds, including V_2 , are selected by the manufacturer applicant and the selected speeds and resulting flightpaths are shown to comply with the appropriate FAR. To prescribe an optimum takeoff-climb speed schedule is inappropriate since what is optimum for one set of parameters may not be optimum for another; e.g., close-in obstacles versus far-out obstacles, accelerate-stop versus accelerate-go, etc. The optimization of all variables is not possible and cannot be required.

Assuming that "optimum takeoff-climb airspeed schedules" refers to the unique situation during a takeoff-climb of maintaining a speed between V_2 and $V_2 + 10$ knots if already attained at the time of an engine failure, the FAA is presently analyzing the data and recommendations obtained from the regional studies referenced in response to (a). If the analysis reveals an equivalent level of safety, the appropriate data and procedures are being incorporated into the respective Airplane Flight Manuals (AFM). Further, this data also will be analyzed at the scheduled April meeting of the FAA's Flight Standardization Policy Board. If procedures in respective AFM's are revised, the FSB members will initiate actions to ensure that operators' training and checking procedures and operating manuals are appropriately revised.

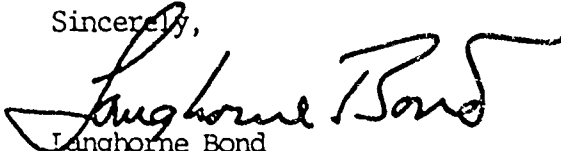
COMMENT A-79-105(c):

Flight director systems of widebody aircraft are highly sophisticated special purpose computers. For example, the DC-10 flight director automatically computes $V_2 + 10$ for normal climb and makes modifications to V_2 in the case of an engine failure. The DC-10 flight director may have the capacity to meet the intent of the recommendation. Technically, different details apply to other widebody aircraft, but they, too, may have the capacity to meet the requirements envisioned by the recommendation.

Most of the flight director systems in use in the narrow body air carrier fleet, however, do not have the necessary data sources or computation capability to automatically vary the displayed pitch angles of the "optimum" airspeed schedule referenced in recommendation (a). Consequently, many display a fixed-pitch attitude or airspeed/angle-of-attack reference in a takeoff or go-around mode.

Flight directors are considered optional equipment. They are approved for use on the basis that they are of a design appropriate to their intended function and that they work properly when installed. Flight directors are a means of providing assistance to a pilot, with altitude and airspeed remaining the primary references. Many carriers' procedures do not call for the use of flight directors on takeoffs. Before issuing recommendations to mandate a modification of flight directors to provide information corresponding to the speed schedules discussed above, or to provide in that design for a wide variety of contingencies, we intend to have the Flight Standardization Policy Board consider these issues during the forthcoming April meeting.

Sincerely,


Langhorne Bond
Administrator

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: December 28, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-106 and 107

On November 9, 1979, a Western Airlines B-727 and a Funbirds Flying Club Rockwell Commander AC-112B nearly collided on airway V-66 about 9 miles northeast of Lindbergh Airport in San Diego, California, at 4,500 feet m.s.l. The location is within the designated San Diego Terminal Radar Service Area (TRSA). The Western jet was under the control of San Diego Approach Control on a full instrument approach to Lindbergh Airport, and the Commander was on a VFR night cross-country flight eastbound to Imperial, California. The Commander pilot had just departed Montgomery Airport and was not in contact with San Diego Approach Control, although the pilot was aware that he was flying through airspace where positive separation from other aircraft was available if he chose to ask for that service.

On November 18, 1979, another midair near-collision occurred on the same airway about 1 1/4 miles west of the San Diego sports stadium. A Pacific Southwest Airlines (PSA) B-727 was being radar vectored for an approach to Lindbergh Airport by San Diego Approach Control. The approach controller issued a "conflicting traffic" advisory to the PSA flightcrew, which identified the traffic as being "right below us." The approach controller did not know about the conflicting traffic until a few seconds before the two aircraft passed each other. The aircraft was a Piper Twin Commanche PA-30, which had taken off from Montgomery Airport on a VFR flight en route to Imperial. This aircraft had attempted to contact San Diego Approach Control about 1 minute before the PSA jet passed near it, but the pilot had not been radar-identified until moments before the near-collision which took place at an altitude of about 6,200 feet m.s.l. The PSA captain said that, if the controller had not issued the conflicting traffic advisory, his aircraft would have collided with the Piper. This midair near-collision also occurred within the San Diego TRSA. In neither case was the small aircraft equipped with a Mode-C altitude encoding transponder.

2833

The Safety Board is concerned that these two similar incidents again demonstrate the potential for another catastrophic midair collision in the San Diego area. While recognizing that the Federal Aviation Administration's recent Notice of Proposed Rule Making (NPRM) 79-AWE-17 will in all likelihood ultimately result in the establishment of a Terminal Control Area in San Diego, the Safety Board believes that this action does not satisfy the immediate need for segregating controlled, high-performance aircraft and uncontrolled aircraft in the high-density San Diego area, which includes several Airport Traffic Areas in proximity to one another. The busiest of these facilities, Montgomery Airport, lies directly below the arrival flightpath of commercial aircraft approaching San Diego's Air Carrier Terminal, Lindbergh Field. Airway V-66 runs directly through the center of the San Diego terminal area, and is a heavily used eastbound route for aircraft departing airports in the San Diego area.

The Safety Board believes that serious danger continues to exist for a catastrophic aircraft collision in the San Diego area, and that preventive action must be taken immediately. Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Immediately exercise its emergency authority and impose mandatory requirements that all pilots communicate with San Diego approach control and receive an appropriate ATC clearance, on a first-come, first-served basis, before entering the San Diego Terminal Radar Service Area. This should be identified as an interim action until a Terminal Control Area is implemented. (Class I, Urgent Action) (A-79-106)

Expedite the establishment and implementation of a Group II TCA at San Diego, with the special requirement that aircraft utilizing the airspace be equipped with an operating Mode-C Altitude Encoding Transponder. (Class I, Urgent Action) (A-79-107).

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.



James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20590

February 1, 1980



OFFICE OF
THE ADMINISTRATOR

Mr. Elwood T. Driver
Vice Chairman
National Transportation Safety Board
300 Independence Avenue, S.W.
Washington, D.C. 20594

Dear Mr. Driver:

I have reviewed your January 11 letter commenting on the Aircraft Owners and Pilots Association's Petition Notice PR 79-13; the Federal Aviation Administration's Petition Notice 79-17, San Diego Terminal Control Area (TCA) proposal; and my response of January 7 to the National Transportation Safety Board's safety recommendations A-79-106 and 107. A copy of your comments will be placed in the respective dockets and given consideration in reaching a final regulatory conclusion as to the design and need for the San Diego TCA.

I regret that you consider my response of January 7 to the safety recommendations A-79-106 and 107 as "Open — Unacceptable Action." Our differences of opinion seem to narrow down to your recommendation for immediate action versus the required deliberative process FAA is pursuing in this matter.

As a result of that difference, we recently completed another on-site observation of air traffic operations in the San Diego area, and I now feel even more strongly dedicated to an orderly continuation of the regulatory process, having concluded that premature action will not be in the best interest of safety.

In order to expedite the rulemaking review process, I have directed that the comments be reviewed as they are received. Barring a deluge of late comments, our review action should be completed by February 15. Should a final decision be reached to implement the TCA after the review process, we would expect to have the San Diego TCA effective by late March.

I believe this expedited action is timely and will achieve the desired safety objectives for the San Diego area.

Sincerely,

Original signed by:
Langhorne Bond
Administrator



Office of the
Chairman

National Transportation Safety Board

Washington, D.C. 20591

January 11, 1980

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Bond:

We have reviewed (AOPA) Petition ~~NOTICE NO.~~ PR 79-13 (Docket No. 19829) which proposes the establishment and use of safety corridors by terminal area traffic operating to and from San Diego, California. The following comments are submitted for your consideration on this matter.

While the Safety Board has examined the rationale for AOPA's views regarding the potential benefits of designated safety corridors for the San Diego terminal area, we do not share its belief that the proposal is a better alternative than the Federal Aviation Administration's TCA proposal. The corridor concept is too restrictive for practical use and does not provide the flexibility needed by Air Traffic Control (ATC) to effectively control all air traffic utilizing the San Diego airspace. The safety hazard requires that separation service be provided to all users of the terminal airspace operating under ATC. The Safety Board believes that the narrow confines of the proposed corridors would restrict the controller's capability to provide such services, increase his workload, and under certain circumstances create more operational problems for ATC than the proposed corridors would resolve.

On December 28, 1979, the Board issued Safety Recommendations A-79-106 and 107. Recommendation A-79-107 stated that the Federal Aviation Administration (FAA) should "Expedite the establishment and implementation of a Group II TCA at San Diego, with the special requirement that aircraft utilizing the airspace be equipped with an operating Mode-C Altitude Encoding Transponder."

The National Transportation Safety Board believes that the policy followed by the FAA over the years of developing TCA's has proven to be effective, and we support Notice of Proposed Rulemaking No. 79-17, "Proposed Group II Terminal Control Area--San Diego, California." However, we continue to believe that promulgation of the final rule should be expedited and that an additional requirement for Mode-C altitude encoding transponders for all aircraft should be adopted.

Our emergency recommendations were prompted by our belief that a particularly hazardous condition exists in the San Diego area. Both AOPA's Petition No. PR 79-13 and the FAA's NPRM No. 79-17 are consistent with our contention that there is a need for operational changes in the San Diego terminal area to assure safe and efficient use of the local airspace.

In FAA's January 7, 1980, response to our recommendations, the FAA contended that our recommendations would create a new form of controlled airspace; we do not agree. We propose no changes in the dimensions of the present TRSA or the proposed Group II TCA. With regard to Recommendation A-79-106, the only "unfamiliar requirement" which would be levied on both pilots and controllers would be a requirement that pilots establish communications with the controllers before entering the TRSA. Our recent investigations of near collisions at San Diego reveal that these incidents more usually have involved pilots who either do not choose to avail themselves of the optional separation service or enter the TRSA before contacting ATC, leaving the controller little time to react should a conflict arise. Our recommended mandatory communications requirement does not constitute a drastic change nor would the change require an extended period of public education: it involves only the San Diego terminal area where the existence of a serious problem is unduly recognized. Changes in charts and other aeronautical publications would certainly be needed, but the need for such changes does not, in the Safety Board's opinion, constitute sufficient cause to maintain the status quo in the San Diego area.

An AOPA official has estimated that 90 percent of all general aviation pilots who operate in the San Diego area communicate with ATC. The other 10 percent may never choose to use the TRSA airspace for one reason or another, such as not having radios aboard or not needing to transit the airspace. However, even a full 10 percent increase in communications workload should neither result in an intolerable burden on controllers nor an inconvenience and waste of fuel for the users of the airspace. With reference to the incidents cited in Safety Recommendations A-79-106 and 107, both small airplanes departed Montgomery Airport and climbed into the TRSA, and this seems to be the source of most of the conflicts. Your concern for the probability of "dangerous concentrations of uncontrolled aircraft just outside of the TRSA" would seem to be speculative. Our concern for the probability of a collision between controlled and uncontrolled traffic just inside the TRSA is based on our review of actual near-collisions in the San Diego area.

In three cases involving mid-air near collision reports at San Diego, an air carrier aircraft was descending under ATC control in the TRSA on a downwind leg for a landing on runway 27 at Lindbergh Field. In each case a general aviation aircraft had departed Montgomery Airport and was climbing eastbound on approximately the same heading as the air carrier. In each of the three incidents, the general aviation aircraft

was being overtaken by the air carrier aircraft and conflict occurred within the designated TRSA airspace. In two of these incidents, the pilots of the general aviation aircraft had penetrated the TRSA airspace and contacted approach control just before the reported incident. In one instance, the pilot was not in radio contact with approach control.

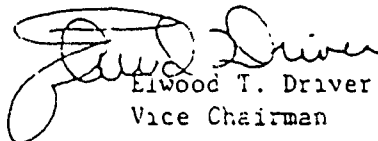
If this potentially dangerous situation is to be resolved, the Safety Board believes it is essential that pilots who find it necessary to enter the TRSA airspace communicate with San Diego Approach Control before entering so that their presence is known to the controller. The knowledge of their impending presence would allow the controller sufficient time to provide traffic advisories or to issue appropriate instructions to the aircraft so that effective separation is maintained.

We believe the needs of the users would be better served by a mandatory requirement for an altitude reporting (Mode-C) transponder at San Diego. If a need for this requirement should arise at other Group II TCA's, we are confident that normal rulemaking procedures will identify such a need.

We are aware that FAA fulfillment of our recommendations may require withdrawing the current NPRM. However, we believe that in view of the dangerous situation at San Diego, the FAA should choose to expedite this action by whatever means are at its disposal.

In the meantime, we consider your response to Safety Recommendations A-79-106 and A-79-107 as "Open--Unacceptable Action."

Sincerely,


Elwood T. Driver
Vice Chairman

Enclosures

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20560

January 7, 1980



OFFICE OF
THE ADMINISTRATOR

Honorable James B. King
Chairman, National Transportation
Safety Board
Washington, D.C. 20594

Dear Mr. Chairman:

On December 28, 1979, I received your Safety Recommendations A-79-106 and 107 dealing with air safety in the San Diego area.

Earlier--October 18, 1978--the National Transportation Safety Board had recommended a Terminal Radar Service Area (TRSA) at Lindbergh Airport and establishment of Terminal Control Areas (TCAs) in San Diego and wherever else they were needed.

We followed these recommendations by putting a TRSA into operation at Lindbergh Field on April 19, 1979, and setting out to install TCAs at 38 locations throughout the country. One of these was San Diego, and the Federal Register of December 6, 1979, carried a Notice of Proposed Rule Making to that effect. The public comment period was 60 days.

The law does not provide us the luxury of moving more rapidly than this. Perhaps this is just as well, for public participation in the deliberative process allows us to come up with the safest and least burdensome TCA configuration for each site, as well as letting us weigh environmental and economic factors. It also lets us make major changes in the air traffic rules with safety, by giving us the time to educate pilots and controllers in their new responsibilities.

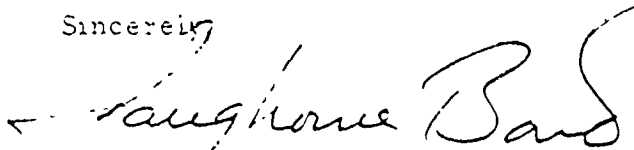
But I am afraid that your December recommendation for an immediate, mandatory TRSA at San Diego risks creating confusion that would detract from safety, not add to it. Your recommendation would create what amounts to a new form of controlled airspace, with unfamiliar requirements suddenly laid on both pilots and controllers. I don't feel we should undertake so drastic a change without a period of public education. There should be time, too, for changes in charts and other aeronautical publications.

Even then there would be problems. Before planes could enter this new type of airspace, controllers would have to identify and issue clearance to them, although many of the aircraft would not be carrying transponders. This would lead to dangerous concentrations of uncontrolled aircraft just outside the TRSA, waiting for controllers to identify them on the radar screen by ordering their pilots to perform turns. This would greatly increase the burden on controllers, as well as causing inconvenience and waste of fuel.

The Board's recommendation regarding mandatory carriage of an altitude reporting (Mode C) transponder is a separate issue. To adopt it for San Diego now would only slow down the current regulatory process. Besides, if it is a good idea for San Diego, it should apply to other Group II TCAs as well, and should be considered in a broader context. This issue is a part of our overall airspace review now underway.

Your recent recommendations came seven weeks after the first incident you cite. I would very much appreciate a chance to review the study you undoubtedly made in the interim, leading you to conclude that the steps you recommended in 1978 are now inadequate.

Sincerely,

A handwritten signature in dark ink, appearing to read "Langhorne Bond". The signature is fluid and cursive, with a large, sweeping "B" at the end.

Langhorne Bond
Administrator

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

ISSUED: December 28, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-108

The National Transportation Safety Board has sent an accredited representative to assist the United Kingdom Accident Investigation Branch and coordinate the U.S. efforts in the investigation of the accident involving Pan American flight 162, a Boeing 747, at the Heathrow Airport, London, on December 27, 1979.

The preliminary evidence indicates that the aircraft touched down firmly while landing in a gusty crosswind condition. Shortly afterwards the forward part of the righthand outboard engine was observed to drop leaving the engine attached at the rear and a fire developed. The fire was quickly extinguished and the crew escaped without injury.

The partial engine separation occurred in the pylon structure at the front engine mount bulkhead (pylon station 128). Although the cause for this separation has not been determined, the personnel participating in the investigation are concerned that a condition such as loose or missing fasteners or structural fatigue damage may have preexisted and contributed to the ultimate overload failure.

The Safety Board is aware that the U.K. Civil Aviation Authority has urged the Federal Aviation Administration to require an inspection of the pylon structure in the area of the forward engine attachment point on the U.S. Boeing 747 fleet. The Safety Board believes that because of the potential catastrophic effects of an engine separation, the Federal Aviation Administration should take expeditious action in accord with the CAA's recommendation.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue a telegraphic Airworthiness Directive to require a one-time inspection of the engine pylon structure in the area of pylon station 128 for loose or missing fasteners and fatigue damage for B-747 aircraft equipped with P&W JT9D engines. (Class I, Urgent Action) (A-79-108)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, BURSLEY, and GOLDMAN Members concurred with this recommendation.

James B. King.

By: James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

March 19, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, SW.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to Safety Recommendation A-79-108 issued by the National Transportation Safety Board on December 28, 1979. This recommendation resulted from an accident involving a Pan American Boeing 747, at Heathrow Airport, London, on December 27, 1979.

In its December 28 transmittal letter, the Board stated that the preliminary evidence indicated that the aircraft touched down firmly while landing in a gusty crosswind condition. Shortly afterwards, the forward part of the righthand outboard engine was observed to drop, leaving the engine attached at the rear. Although the cause for the partial engine separation had not yet been determined, the participants in the investigation were concerned that damage may have preexisted and contributed to the failure. The United Kingdom Civil Aviation Authority (CAA) had advised the Federal Aviation Administration (FAA) in a telegraphic message (copy enclosed), dated December 28, 1979, that it was of the opinion that urgent action should be taken to institute inspection of all Boeing 747 aircraft. In transmitting Safety Recommendation A-79-108 to the FAA, the NTSB expressed its belief that the FAA should take expeditious action in accord with the CAA's recommendation.

The following FAA actions in response to this recommendation are submitted for the public record:

A-79-108. Issue a telegraphic Airworthiness Directive to require a one-time inspection of the engine pylon structure in the area of pylon station 128 for loose or missing fasteners and fatigue damage for B-747 aircraft equipped with P&W JT9D engines.

Comment. On December 28, 1979, the FAA issued telegraphic Airworthiness Directive T79-NW-21, effective upon receipt, which required inspection of the fasteners attaching the nacelle strut forward engine mount bulkhead to the horizontal firewall of the strut for loose or missing fasteners and inspection of the bulkhead chords and webs for cracks. The Airworthiness Directive is detailed in the enclosed submission to the Federal Register, which was published February 7, 1980, in Vol. 45 FR 8285-6.

Sincerely,

A handwritten signature in cursive script, reading "Langhorne Bond". The signature is written in dark ink and is positioned above the printed name and title.

Langhorne Bond
Administrator

Enclosures

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

ISSUED: April 18, 1974

Forwarded to:

Honorable Alexander P. Butterfield
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-74-12 thru 14

On July 23, 1973, an Ozark Airlines Fairchild Hiller FH-227B was involved in an accident at St. Louis, Missouri. The National Transportation Safety Board's investigation of the accident revealed three safety items which warrant corrective action.

First, until just before the accident, air traffic controllers at St. Louis issued clearances for approaches and landings, despite the thunderstorms which were over the initial approach path, the final approach path, and the airport. Immediately before the accident, the local controller stopped issuing departure clearances. Although the controller did not have authority to stop departures because of the weather, the Safety Board believes that he acted in the best interest of safety. It further believes that, in conditions they deem hazardous, controllers should be given the authority to deny (1) approach and landing clearances when thunderstorm activity exists over either the approach path or the airport and (2) departure clearances when thunderstorm activity exists over either the airport or the departure path. This new authority would make more effective use of the wealth of terminal weather information available to the controller, specifically:

- a. His direct and continuing visual observation of local atmospheric conditions and associated aircraft behavior.
- b. His receipt and evaluation of pilot reports (PIREP's) regarding flight conditions in the terminal area.
- c. The informative capacity of ground-based radar.
- d. The direct links for transmission of terminal weather reports between the National Weather Service and ATC.

Honorable Alexander P. Butterfield (2)

Since 1963, accidents in which thunderstorm activity was a factor have caused over 100 deaths, 40 serious injuries, and millions of dollars in property damage. Among these accidents are the following:

American Airlines, Knoxville, Tenn., 1962
Mohawk Airlines, Rochester, N.Y., 1963
American Airlines, New York, N.Y., 1964
DH-125, Paducah, Ky., 1966
Grumman TBM, Elko, Nev., 1966
Lockheed PV-1, Philadelphia, Pa., 1971
Eastern Air Lines, Ft. Lauderdale, Fla., 1972
National Airlines, New Orleans, La., 1972
Convair 990, Agana, Guam, 1973

Second, just before the accident in St. Louis, through the use of radar incapable of displaying different levels of precipitation echo intensity, controllers vectored several aircraft through a solid squall line which contained severe thunderstorm and tornado activity. The controllers vectored the aircraft through the narrowest portion of the precipitation echo pattern displayed on the radarscope in order to get the aircraft to a final approach course. In our opinion, this was a very dangerous practice because the controller's radarscope display did not indicate whether the line of echoes contained a severe thunderstorm or tornado. The Safety Board believes that radar capable of locating severe weather and displaying convective turbulence should be developed for and used in the terminal areas.

Third, the Safety Board learned that the tower and approach control facility at St. Louis has no system by which to relay severe thunderstorm warning bulletins to inbound and outbound flights when the terminal area is included in such bulletins. The lack of such a system was not a factor in this accident, because the severe thunderstorm warning bulletin which had been issued about 3 minutes before the accident by the National Weather Service, was not relayed to the tower and approach control until after the accident. Nevertheless, the Safety Board believes that the information contained in these bulletins is vital to every pilot who must decide whether to fly into or out of a terminal area which is affected by thunderstorm activity. We also believe that these bulletins should be relayed expeditiously.

Accordingly, the National Transportation Safety Board recommends that the Federal Aviation Administration:

1. Revise terminal air traffic control procedures to authorize controllers, when they deem an operational hazard is present, to deny (1) approach and landing clearances when thunderstorm

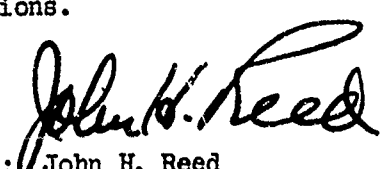
Honorable Alexander P. Butterfield (3)

activity exists over either the approach path or the airport, and (2) takeoff clearances when thunderstorm activity exists over either the airport or the departure path.

2. Develop and install terminal air traffic control radar capable of locating severe weather and displaying convective turbulence. This radar should be used to vector aircraft around severe weather.
3. Implement, in cooperation with the National Weather Service, a system to relay severe thunderstorm and tornado warning bulletins expeditiously to inbound and outbound flights when such bulletins include the terminal area.

Members of our Bureau of Aviation Safety will be available for consultation if desired.

REED, Chairman, McADAMS, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendations.


By: John H. Reed
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

March 28, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, S.W.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to your January 28 letter concerning National Transportation Safety Board Recommendation A-74-14.

Our regions have recently concluded an evaluation of the effectiveness of our Center Weather Service Units, and the results indicate that the program is extremely successful. The weather intelligence now available to air traffic control personnel has improved considerably and allows for timely dissemination of severe weather information.

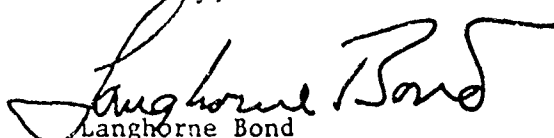
Although we believe our current efforts and improved procedures fulfill the requirements of NTSB Recommendation A-74-14 and are responsive to current aviation weather needs, we are continuing our search for better, more effective solutions to weather-oriented problems.

We are planning a single-site operational test of color weather radar equipment which, if successful, would provide a weather radar display at appropriate air route traffic control center control sectors.

In addition, we have tasked the Systems Research and Development Service to continue to pursue the development of methods which will further improve our weather dissemination capability.

The FAA considers action completed on this recommendation and, unless otherwise notified, we will not report further on this.

Sincerely,


Langhorne Bond
Administrator



National Transportation Safety Board

Washington, D C 20594

Office of
Chairman

January 28, 1980

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Bond:

Thank you for your letter of September 11, 1979, describing the many actions taken by the Federal Aviation Administration (FAA) to satisfy Safety Recommendation A-74-14. The steps taken show a genuine effort on the part of the FAA to collect and disseminate severe weather information, but based upon our observations the problem does not appear to be solved.

Convective SIGMETs depend, among other things, upon the National Weather Service standard of intensities of level 4 or greater with an areal coverage of 4/10 or more. Thunderstorm activity threatening a terminal often does not satisfy these criteria, and hence there is no warning through this medium.

The assignment of meteorologists to the ARTCC's should result in improved dissemination of weather information. At the present time, however, information on the location and severity of convective storms is not consistently reaching the individual sector controllers or other ATC facilities. Direct video weather radar displays in the centers might solve this problem. However, at the present time they are installed at only one ARTCC, and experience with the system has been insufficient to fully evaluate its capabilities.

As an example of the current problems, on August 22, 1979, Eastern Flight 693, a Boeing 727, encountered windshear associated with thunderstorm activity during an approach to Hartsfield Atlanta International Airport. The aircraft dropped about 800 feet in altitude and sustained damage to all three engines during recovery. There were no SIGMETs covering the area of the airport, and the pilot was not informed as to the severity of the thunderstorm activity.

Honorable Langhorne M. Bond

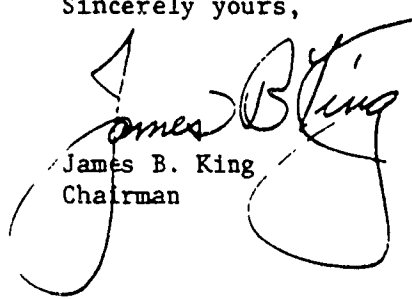
- 2 -

Although A-74-14 applies to terminal areas, the procedural changes listed in your letter apply equally to en route flight. On June 21, 1979, about 60 miles southwest of Salina, Kansas, TWA Flight 1, an L1011, was attempting to navigate between thunderstorm cells when it encountered damaging hail. None of the convective SIGMETs in effect at the time covered the local environment, and the pilot was not informed of the intensity of the cells in the area. Evidence indicates that the sector controller did not have such information. The pilot stated that had he known the severity of the thunderstorms he would not have flown close to them.

It is evident from the above cases that timely and sufficient severe weather information may not be provided to controllers and pilots in sufficient time to avoid encounter with potentially hazardous thunderstorms. We, therefore, request that the FAA reevaluate the effectiveness of the Center Weather Service Units and assure us further that appropriate action is being taken to expeditiously disseminate severe weather information.

Based upon the above, we are continuing to classify A-74-14 in an "Open--Acceptable Action" status.

Sincerely yours,


James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

FOR RELEASE: 6:30 P. M., E.D.T., SEPTEMBER 19, 1976.

202-426-8787

ISSUED: September 19, 1976.

Forwarded to:

Honorable John L. McLucas
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-76-122 through 128

The National Transportation Safety Board continues to be concerned about the number of accidents that occur in low visibility environments during the completion of an instrument landing system approach. Because of that concern, the Safety Board conducted a study¹ of flightcrew coordination procedures which are applicable during the approach and landing phase, and particularly applicable during the visual transition period of instrument flight when flightcrews transfer their attention to visual cues for flightpath guidance. The 1970 through 1975 air carrier and supplemental air carrier ILS accident and incident data were examined to assess these procedures and flightcrew performance during the execution of these procedures.

The accident and incident data disclosed that almost every mishap occurred after the flightcrew had seen either the ground, the airport, or the runway environment and was trying to transition from instrument to visual flight procedures.

The study found that low visibilities compromised the quality and reliability of the visual cues on which the pilot flying relies for vertical guidance; therefore, only timely and proper integration of flight instrument data into the flight can detect or prevent undesired excursions from the correct flightpath. Consequently, continuous monitoring of the aircraft's flight instruments is necessary from the outer marker (OM) to landing, and the duty to monitor these instruments should be assigned as a specific task to a specific crewmember.

There were several approaches during which callouts of visual contact, either authorized or unauthorized in the carrier's procedures, resulted in premature abandonments of instrument flight procedures. The evidence disclosed that instrument flight procedures should be maintained to the

¹/ NTSB AAS 76-5, "Flightcrew Coordination Procedures in Air Carrier Instrument Landing System Accidents."

lowest possible altitudes commensurate with the approach procedure. Callouts which can result in a premature abandonment of instrument procedures should be prohibited. Sighting calls should be limited to visual acquisition of the airport, the approach lights, runway lights, or the runway, particularly during a nonprecision approach. The study found further that within each individual carrier's procedures, altitude callouts for both visual and instrument approaches should be standardized.

Evidence gathered during the study disclosed that greater use of the autopilot approach coupler will augment instrument approach safety. Depending upon the reliability of the ILS facility, if sufficient visual cues exist to continue the approach, the autopilot should remain engaged until its minimum certified altitude has been reached. Secondly, the efficiency of the autopilot-coupler and automatic landing systems would be enhanced if air traffic control procedures were adopted which would insure that the flightcrew be released from all airspeed restrictions at least 3 to 4 miles outside the OM on ILS approaches conducted in instrument meteorological conditions.

Though the Safety Board could reach no conclusions regarding the use of the heads-up instrument display (HUD) in the low visibility environment, we believe that study and evaluation of this instrument system, as well as other types of advanced landing and instrumentation systems, should be continued; therefore, we endorse FAA's current project to evaluate and determine the role of HUD.

As a result of this study, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Expedite evaluation and developmental programs for advanced landing systems. (Class II - Priority Followup) (A-76-122)

Institute procedures which require air traffic controllers to release an aircraft from all airspeed restrictions at least 3 to 4 miles outside of the outer marker on all ILS approaches when the reported weather is below basic VFR minima. (Class II - Priority Followup) (A-76-123)

... In conjunction with the air carriers:

Implement flightcrew coordination procedures which will insure continuous monitoring of the aircraft's instruments from the OM to landing. The wording of monitoring tasks should be specific. Flightcrew procedures which require a transfer or exchange of visual scanning responsibilities should require that the appropriate crewmember announce that he is relinquishing previously assigned duties or responsibilities. (Class III - Longer Term Followup) (A-76-124)

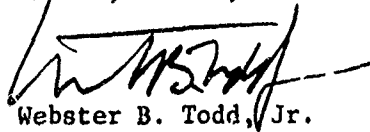
Develop flightcrew coordination procedures which will limit sighting callouts to those visual cues which are associated with the runway environment. Unrequired callouts which can result in the premature abandonment of instrument procedures should be prohibited. (Class III - Longer Term Followup) (A-76-125)

Develop a standard flightcrew coordination procedure within each carrier for altitude callouts to be used on all approaches under all conditions. (Class II - Priority Followup) (A-76-126)

Encourage flightcrews to keep the autopilot-coupler engaged until its minimum certified altitude has been reached. (Class II - Priority Followup) (A-76-127)

Include in air carrier training programs flightcrew discussions of formal reports involving approach and landing accidents or incidents. Special emphasis should be placed on those mishaps involving human limitations. (Class III - Longer Term Followup) (A-76-128)

TODD, Chairman, BAILEY, Vice Chairman, McADAMS and HOGUE, Members, concurred in the above recommendations. HALEY, Member, did not participate.


By: Webster B. Todd, Jr.
Chairman

THIS RECOMMENDATION WILL BE RELEASED TO THE PUBLIC ON THE ISSUE DATE SHOWN ABOVE. NO PUBLIC DISSEMINATION OF THIS DOCUMENT SHOULD BE MADE PRIOR TO THAT DATE.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

March 28, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, S.W.
Washington, D.C. 20594

Dear Mr. Chairman:

The following information updates the action taken by the Federal Aviation Administration (FAA) concerning NTSB Safety Recommendation A-76-123.

Recommendation A-76-123. Institute procedures which require air traffic controllers to release an aircraft from all airspeed restrictions at least 3 to 4 miles outside of the outer marker on all ILS approaches when the reported weather is below basic VFR minima.

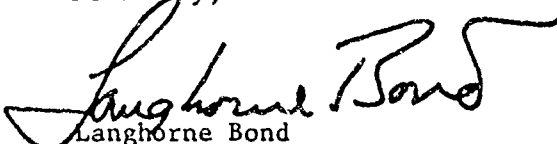
Comment. Air traffic control procedures do not permit speed adjustment after an aircraft is cleared for approach except for separation purposes. In no event may adjustments be applied closer to the airport than the final approach fix or 5 miles from the runway, whichever is farther from the runway. Speed management is a cooperative matter. The pilot may refuse a requested speed and state a requested speed and/or final approach intercept point. The norm for all approaches is to terminate speed adjustment when an approach clearance is issued. In many instances, higher than reference speeds are permissive and desirable. Clean configurations and the resulting higher speeds are important factors in greater fuel economy.

When weather conditions are less than ceiling 500 feet above the minimum vectoring altitude, visibility 3 miles--vectors must provide for intercept of the final approach course at least 2 miles outside the approach gate, at an altitude not above the glide slope, for a precision approach, or for a nonprecision approach, at an altitude which will allow descent in accordance with the published procedure. The approach gate is a point on the final approach course 1 mile from the final approach fix on the side away from the airport or 5 miles from the landing threshold, whichever is farther from the landing threshold. Thus, the minimum final approach course intercept point would be 7 miles from the landing threshold. However, the usual intercept point for precision (ILS/PAR) approaches is 8 or more miles. We receive only an occasional user complaint concerning either turn-on distances or release from or refusal of pilot requested speed adjustments.

There is no desire on the part of air traffic control to unnecessarily impose speed management techniques. To the contrary, our desire is to allow as much aircrew latitude as possible. The Airman's Information Manual, paragraph 272, was revised in January 1979 and reflects current practices.

The FAA considers action completed with regard to this recommendation.

Sincerely,


Langhorne Bond
Administrator

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

NOV 30 1976

Honorable Webster B. Todd, Jr.
Chairman, National Transportation Safety Board
800 Independence Avenue, S. W.
Washington, D. C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendations A-76-122 through 128.

A-76-122 Recommendation No. 1. Expedite evaluation and developmental programs for advanced landing systems.

Comment. The FAA is already expediting two advanced landing system programs conducted by our Systems Research and Development Service. These are the Microwave Landing System (MLS) and the evaluation of a Head-Up Display (HUD). In addition, the automatic landing capability is being progressively improved and encouraged. The FAA welcomes the NTSB's endorsement of our HUD evaluation program. In order to determine, as soon as possible, whether or not the HUD can be expected to increase landing safety, I have written to the Administrator of the National Aeronautics and Space Administration (NASA) requesting their assistance in this effort. Both FAA and NASA are currently working together to develop a HUD program plan by December 1. In addition, wide-bodied aircraft and some B-727's have sophisticated Automatic Landing Systems (ALS) which will further enhance the operators' capabilities in Category II and IIIa all weather operations.

A-76-123 Recommendation No. 2. Institute procedures which require air traffic controllers to release an aircraft from all airspeed restrictions at least 3 to 4 miles outside of the outer marker on all ILS approaches when the reported weather is below basic VFR minima.

Comment. The following should be noted:

1. Present air traffic control procedures require all flights to be turned on the localizer at least 3 miles outside of the OM or 7 miles from the threshold, whichever is farther, during instrument meteorological conditions.
2. Air traffic control airspeed restrictions are automatically cancelled when clearance for an approach is issued. This clearance is routinely issued prior to the turnon point and, therefore, normally releases the flightcrew from speed restrictions earlier than the NTSB recommends.

3. Controllers are permitted to restate airspeed restrictions, if necessary, (to preclude S-turns or discontinuance of the approach) up to the OM, but not beyond. This option is only exercised when traffic volume dictates.

4. Pilots have the latitude to vary airspeed up to 10 knots either side of assigned speed.

5. Pilots have the prerogative to refuse any clearance which may affect the safe operation of his aircraft.

Preliminary review of the impact of adopting the recommendation disclosed that it could result in a reduction of airport acceptance rate by approximately eight aircraft per runway, per hour. Since FAA has the responsibility to promote both safety and the efficiency in air commerce, we respectfully request a copy of the evidence mentioned in the NTSB release so that we might reach a more informed decision in the matter.

Recommendation No. 3. Implement flightcrew coordination procedures which will insure continuous monitoring of the aircraft's instruments from the OM to landing. The wording of monitoring tasks should be specific. Flightcrew procedures which require a transfer or exchange of visual scanning responsibilities should require that the appropriate crewmember announce that he is relinquishing previously assigned duties or responsibilities.


Comment. The NTSB Study, AAS-76-5, acknowledges that the FAA has published guidelines which outline recommended instrument approach monitoring procedures and callouts in Handbook 8430.6A. This is guidance material for our Principal Operations Inspectors (POI) on what is considered acceptable for inclusion in air carrier training programs. Although this is not regulatory in nature, through the efforts of the principal operations inspectors and the cooperation of the operators, the procedures and callouts outlined in our handbook have been included in operators training programs and are used in line operations. The procedures involved in the transfer or exchange of visual scanning responsibilities are devised by the operator so they will be compatible with the overall callout procedures. Our handbook procedures do recommend that the pilot not flying, monitor the flight instruments during an instrument approach.

The NTSB study points out that the flightcrews and management personnel of the air carriers interviewed, all considered that their particular callout procedures were the best. We will again emphasize to all operators the need for strict adherence to established callout procedures.

Recommendation No. 7. Include in air carrier training programs flightcrew discussions of formal reports involving approach and landing accidents or incidents. Special emphasis should be placed on those mishaps involving human limitations.

Comment. A similar proposal, submitted last year for consideration during the First Biennial Operations Review, will be included in a Notice of Proposed Rule Making scheduled for issuance by the end of 1977. However, we believe air carriers should have the latitude of selecting how this information will be disseminated to crewmembers.

Sincerely,


J. W. Cochran
Acting Administrator

It appears that noncompliance with established procedures is the primary problem rather than a lack of adequate procedures. We feel the procedures outlined in FAA Handbook 8430.6A cover the items discussed in this recommendation. Nevertheless, we plan to issue an air carrier operations bulletin by December 31, directing our field inspectors to reemphasize to the air carriers the importance of strict adherence to the recommended altitude callout procedures.

Recommendation No. 4. Develop flightcrew coordination procedures which will limit sighting callouts to those visual cues which are associated with the runway environment. Unrequired callouts which can result in the premature abandonment of instrument procedures should be prohibited.

Comment. We agree that unnecessary callouts should be eliminated. The airlines have developed acceptable flightcrew coordination and callout procedures based upon our recommended procedures. As mentioned in our response to Recommendation A-76-124, we believe that noncompliance with established procedures is the problem rather than a lack of adequate procedures. However, as stated above, we will again emphasize to all operators the need for strict adherence to the recommended callout procedures.

Recommendation No. 5. Develop a standard flightcrew coordination procedure within each carrier for altitude callouts to be used on all approaches under all conditions.

Comment. Altitude callout procedures have been prescribed in Handbook 8430.6A for many years and pertain to approaches conducted under all conditions. However, our handbook procedures for VFR approaches differ from those recommended for IFR approaches. Therefore, no further action on this recommendation is required except for our continuing emphasis to the air carriers on the need for strict adherence to callout procedures.

Recommendation No. 6. Encourage flightcrews to keep the autopilot-coupler engaged until its minimum certified altitude has been reached.

Comment. We agree that flightcrews should be encouraged to keep the autopilot-coupler engaged until reaching the minimum authorized altitude except when using some Category I ILS facilities where beam quality and glideslope threshold crossing heights may require disengagement at a higher altitude. We will request all operators through the POI's to include this information in their manuals and training programs. This will be included in the operations bulletin mentioned above.

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: May 23, 1977

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-77-30 and 31

Within the past year, four accidents in Enstrom helicopters have been caused by material failures. Before these recent failures, only two other accidents had occurred as a result of such failures--one, 6 years ago and another, 8 years ago. The National Transportation Safety Board believes that these failures, which are detailed in the attached table, demonstrate a need for immediate corrective action.

Three of the accidents were caused by fatigue failures in tail rotor spindle, P/N 28-15202. In all three of these failures, high-cycle reverse bending occurred in the seating radius for the blade grip bearing journals. Metallurgical examination of two spindles revealed tensile strengths below minimum specification for normal steel material. The spindles failed at 145 and 483 hours. Metallurgical examination of the third spindle, which failed at 1,222 hours, revealed that fatigue began because of improper machining.

Subsequent to the tail rotor spindle failures, the FAA issued two airworthiness directives which required that the parts be inspected for cracks and tolerance conformity. Although the 50-hour inspection interval may be sufficient to detect incipient cracks before they progress to failure, we are concerned that the past failures indicate a possible design certification deficiency as well as substandard quality control. The development of fatigue is evidence that the life of the part is sensitive to material properties, machining technique, and runout tolerance. Since the part is critical to safe flight of the helicopter, we believe that the fatigue-load and safe-life evaluations should have considered parts with worst tolerance. Such considerations might indicate a need to include the tail rotor spindle on the aircraft's critical parts list.

2073

The fourth accident was caused by separation of a tail rotor blade grip, P/N 28-15017. Metallurgical examination revealed that the part was not heat treated to the proper specifications. The FAA's Aeronautical Center issued an emergency AD on March 2, 1977, to require that the part be replaced.

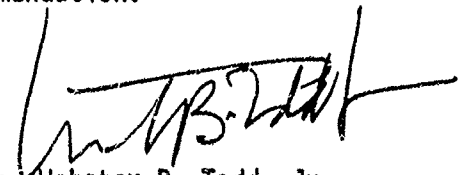
There have been other cases of manufacturing discrepancies on main rotor spindles, P/N 28-14282, and shafts, P/N 28-13104, that have been recalled by AD.

In view of the above, the National Transportation Safety Board believes that further corrective action is necessary and, therefore, recommends that the Federal Aviation Administration:

Inspect the quality assurance program of the Enstrom Helicopter Corporation to insure that all materials, pieces, parts, and components used in the manufacture of helicopters comply with the certificating provisions of 14 CFR 21.33(b)(2) through (4). (Class--I Urgent Followup) (A-77-30)

Review the certification engineering data to insure that critical tolerance considerations are included in the fatigue replacement time evaluation of the tail rotor spindle as set forth in 14 CFR 27.571(c). In addition, in view of the low-time failures and possible fatal consequences, require that tail rotor spindle (P/N 28-15202) be added to the critical parts list. (Class--II Priority Followup) (A-77-31)

TODD, Chairman, BAILEY, Vice Chairman, McADAMS, HOGUE, and HALEY, Members, concurred in the above recommendation.


By: Webster B. Todd, Jr.
Chairman

Attachment

ENSTROM HELICOPTER OCCURRENCES
- MATERIAL FAILURE -

| DATE | ACCIDENT | FAILED PART | DISCREPANCY | HOURS | FAA ACTION |
|---|--|--|---|---------|--|
| 5/10/68 | F-28 N4462 Milwaukee, Wis. | Tail Rotor Spindle | Machining error | Unknown | None |
| 9/23/70 | F-28A N4894 Marianna, Pa. | Tail Rotor Gearbox | Porosity/casting hardness 15% too low | Unknown | None |
| 4/4/76 | F-28A N269Q Blythe, Ca. | Tail Rotor Spindle P/N 28-15202 | Ultimate tensile strength 87 ksi Ave. Spec 90 ksi | 145 | None |
| 8/9/76 | F-28A N68RD Enon, Ohio | Tail Rotor Spindle P/N 28-15202 | Machined radius too small Finish below draw- ing specification | 1222 | Issued AD 76-18-08 Sept. 9, 1976; check for cracks and runout every 100 hrs. |
| 1/8/77 | F-28C N537H Fallentimber, Pa. | Tail Rotor Spindle P/N 28-15202 | Ultimate tensile strength 83 ksi Ave. spec. 90 ksi | 483 | Issued AD 77-04-04 2/28/77; inspection as above every 50 hours and after tail strike. |
| 2/25/77 | 280C N594H Valparaiso, Ind. | Tail Rotor Blade Grip P/N 28-150013-3 | Aluminum alloy 2024 not heat Treated. Soft. | 6.1 | Issued emergency AD dated 3/2/77 Substitute -11 Grip AD 77-06-04 |
| Previous F-28A Accidents/Occurrences | | Main Rotor Spindles P/N 28-14282 | Machining deficiencies | Various | Issued AD 75-22-01 10/20/75, revised 7/1/76 |
| | | Main Rotor Shaft P/N 25-13104 | Tool marks, surface irregularities, cracks | Various | Issued AD 75-26-19 11/28/75, superseded by AD 76-17-08, 8/6/76 |



National Transportation Safety Board

Washington, D C 20594

Office of
Chairman

February 7, 1980

Honorable Langhorne Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Bond:

Thank you for your letter dated January 15, 1980, advising of your action to implement National Transportation Safety Board Recommendation A-77-30.

We are pleased to note that the Enstrom Corporation has issued Service Information Letters No. 0074 and No. 0079. The information provides the operators with more comprehensive data pertaining to the inspection and maintenance measures of the Drive Belts and Overrunning Clutch. Accordingly, the status of A-77-30 is now classified as "Closed--Acceptable Action."

Sincerely yours,

A handwritten signature in dark ink, appearing to read "James B. King", is written over a large, stylized circular flourish.

James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

January 15, 1980

Honorable James B. King
Chairman, National Transportation Safety Board
800 Independence Avenue, S.W.
Washington, D.C. 20594

Dear Mr. Chairman:

This will supplement our letter of November 3, 1978, to advise you that action has been completed with respect to National Transportation Safety Board Recommendation A-77-30 relative to drive belt and overrunning clutch problems on Enstrom helicopters.

The Enstrom Helicopter Corporation has issued Service Information Letters No. 0074, Drive Belt Inspection and Belt Life Requirements, and No. 0079, Overrunning Clutch. These instructions have improved the inspections and maintenance procedures for the drive belt and clutch.

With regard to our suggestion to Enstrom to add a note to the rotorcraft flight manual cautioning against rapid throttle movement as stated in our letter of November 3, 1978, we have reassessed our position and believe that issuance of the Service Information Letters is a satisfactory resolution of the aforementioned problems. Accordingly, we consider the above to be closing action on the Board's recommendation.

A copy of each Service Information Letter is enclosed.

Sincerely,

A handwritten signature in dark ink, reading "Langhorne Bond". The signature is written in a cursive, flowing style.

Langhorne Bond
Administrator

2 Enclosures

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: July 25, 1977

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-77-52 and 53

At 1619, on November 17, 1976, TWA Flight 373 (a B-727), and TWA Flight 516 (a DC-9), almost collided in midair near Appleton, Ohio. As a result of evasive action taken by the pilot of TWA 516, two crewmembers were injured. The National Transportation Safety Board's investigation of the incident revealed that neither the flightcrew of TWA 373 nor the air traffic controller understood or heard correctly each other's message regarding altitude assignment.

Because the Safety Board believed that such a communications problem could have resulted in a midair collision, the Safety Board focused its investigation on the adequacy of actual communications procedures in the air traffic control system. As a result of that investigation, the Safety Board has identified several factors which contributed to the communications problem encountered during the subject incident.

TWA 373 was on a northwesterly heading toward the Appleton (APE) Vortac at flight level (FL) 310; TWA 516 was on a northeasterly heading toward the APE Vortac at FL 270. The aircraft were in both radio and radar contact with the Indianapolis Center's Appleton high altitude sector controller. The controller cleared TWA 373 to descend to FL 280. The crew received the clearance, but they understood the assigned altitude to be FL 230. The first officer promptly acknowledged as follows: "Two three zero TWA three seventy-three." Unfortunately, the controller received only part of the flight's acknowledgment-- "TWA three seventy-three," which he accepted as acknowledgment of proper clearance. Thus, the controller believed that TWA 373 was descending to FL 280, when, actually, the flight was descending to FL 230. The misunderstanding went undetected until after the near collision.

Although examination of the voice transmissions on facility tape recordings revealed that the controller's clearance to FL 280 was intelligible, the Safety Board could not determine how clearly the clearance was received in the cockpit. The tape revealed that the first portion of TWA 373's acknowledgment, which contained the altitude read-back, was unintelligible. The latter part, "TWA three seventy-three," was recorded clearly.

The Safety Board believes that the altitude readback was unintelligible because the first word of the message, "two," was spoken simultaneously with keying of the transmitter, and the words "three zero" followed so rapidly that the first part of the acknowledgment was not understood. Furthermore, this unintelligible sound was so short that it is unlikely that a controller would associate the short garbled sound as a possible transmission.

The Safety Board has reviewed the actual communications procedures and practices currently utilized by pilots and controllers. Our review shows that in the subject incident neither the pilot nor the controller violated any mandatory procedure. In fact, the radio procedures used by both pilot and controller were found to be consistent with those widely used in the ATC system. Such communications practices have apparently gained acceptance within the ATC system even though they represent a deviation from the recommended operating practices and procedures that have been set forth in the Airman's Information Manual, (AIM) Part I "Radio Communications Phraseology and Techniques."

Although it has long been a general practice of pilots to read back an ATC clearance, they do not always follow this practice because read-back of a clearance is not required. Consequently, a controller would not consider it abnormal for a pilot to acknowledge a clearance or instruction by stating his flight identification only.

Another actual communications practice of pilots, with which controllers are familiar, is the manner in which a clearance is read back to him.

Most pilots usually will repeat the clearance in the same order or sequence transmitted to them by the controller, or with minor variations. However, some pilots repeat their clearance in the reverse order of its transmission. This practice appears to be widespread among pilots and is

also widely accepted by controllers. The Safety Board believes this practice should be discontinued because it deviates from the recommended message format prescribed in the AIM, Part I, "Radio Communications Phraseology and Techniques," which the Safety Board believes is an essential part of the procedures. Moreover, a pilot who reads back a clearance in reverse order increases the chances for undetected error if he does not utilize the prescribed microphone techniques and phraseology recommended in the AIM.

The Safety Board's staff had reviewed your proposal No. AAT-332-76-36, a proposed change to Part I of the AIM regarding altitude/vector readback, and had discussed the proposal with your Air Traffic Service personnel before and after the subject accident. We supported that proposed change to the AIM, Part I, which would state that pilots should read back assigned altitudes and radar vector headings. The Safety Board is aware that the proposed changes have been incorporated in the July issue of AIM, Part I, and we believe they will help to eliminate the communications problem which occurred over Appleton, Ohio. However, these changes alone will not guarantee complete resolution of the problem.

The new procedures as now published, inform pilots that they should read back altitude and radar vector heading assignments. Under these circumstances, a controller should expect to receive a clearance readback from a pilot rather than a simple acknowledgment. However, in order to assure that the new procedures are successful, the Safety Board believes that the controller must be given additional responsibilities. If, for any reason, a controller does not receive a clearance readback from the pilot as transmitted, the controller should be required to ask the pilot to read back the clearance as issued. If that action is not taken, misunderstandings will continue to occur and may remain undetected. Therefore, as a final step to eliminate misunderstandings between pilot and controller regarding altitude or vector assignments, ATP Handbook 7110.65 should be amended to require that the controller ask the pilot for a readback if one is not received.

Although such a requirement may temporarily increase the communications workload of the controller slightly, we believe that when pilots become thoroughly familiar with the new reporting procedures the communications workload will not be significantly greater than it is currently.

Honorable Langhorne M. Bond

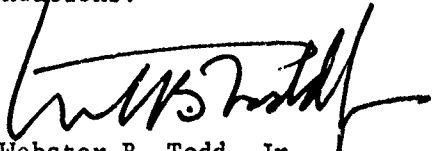
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Based on the foregoing, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Amend the language of ATP Handbook 7110.65 to specify that a controller who issues an altitude assignment and/or a vector heading assignment to an aircraft in flight be required to request readback of the clearance if he does not receive one from the crew. Pilot acknowledgment without readback should not be accepted by the controller. (Class II - Priority Followup) (A-77-52)

Instruct FAA Air Carrier District Office Chiefs and General Aviation District Office Chiefs to alert their personnel to the circumstances surrounding this incident; and require those facilities to take all appropriate action to assure that pilots are made aware of communications procedural requirements and understand why strict adherence to recommended procedures is essential to safe flight. (Class II - Priority Followup) (A-77-53)

TODD, Chairman, BAILEY, Vice Chairman, McADAMS, HOGUE, and HALEY, Members, concurred in the above recommendations.


By: Webster B. Todd, Jr.
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

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Office of
Chairman

National Transportation Safety Board

Washington, D.C. 20594

March 11, 1980

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Bond:

This is to acknowledge your letter of January 30, 1980, updating the status of action taken on the National Transportation Safety Board's Safety Recommendation A-77-52. This recommendation stemmed from our investigation of a near midair collision between a TWA B-727 and a TWA DC-9, near Appleton, Ohio, on November 17, 1976. The recommendation called upon the Federal Aviation Administration (FAA) to: "Amend language of ATP Handbook 7110.65 to specify that a controller who issues an altitude assignment and/or a vector heading assignment to an aircraft in flight be required to request readback of the clearance if he does not receive one from the crew. Pilot acknowledgment without readback should not be accepted by the controller."

We note that the FAA on July 1, 1977, revised the Airman's Information Manual (AIM) recommending that pilots of airborne aircraft read back those parts of air traffic control (ATC) clearances/instructions containing altitude assignments or vectors. We also note that the FAA conducted a system errors examination covering a 3-year period to determine the errors in which omission of a readback was a causative factor. Since we are now assured that pilots are consistently reading back altitudes and vectors as recommended in the AIM, the purpose of A-77-52 has been achieved and is now classified in a "Closed-Acceptable Alternate Action" status.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "James B. King", is written over a circular stamp. The signature is fluid and cursive.

James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591

January 30, 1980



OFFICE OF
THE ADMINISTRATOR

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, S.W.
Washington, D. C. 20594

Dear Mr. Chairman:

The following information updates the status of action taken by the Federal Aviation Administration (FAA) concerning NTSB Safety Recommendation A-77-52.

Recommendation A-77-52. Amend language of ATP Handbook 7110.65 to specify that a controller who issues an altitude assignment and/or a vector heading assignment to an aircraft in flight be required to request readback of the clearance if he does not receive one from the crew. Pilot acknowledgement without readback should not be accepted by the controller.

Comment. On July 1, 1977, we revised the Airman's Information Manual (AIM) by recommending that pilots of airborne aircraft read back those parts of air traffic control (ATC) clearances/instructions containing altitude assignments or vectors. This action was taken prior to the issuance of NTSB Safety Recommendation A-77-52 on July 25, 1977.

In our response to the safety recommendation (December 23, 1977), we stated that we would conduct a preliminary study to determine the feasibility of issuing a Notice of Proposed Rule Making (NPRM) mandating pilot readback of altitudes and vectors. The initial study did not conclusively indicate a need for rulemaking action.

We also examined system errors involving airborne aircraft over a 3-year period to determine the errors in which omission of a readback was a causative factor. During this period, there were a total of 1,652 system errors. One of those involved a pilot's failure to read back an altitude/vector and nine involved a pilot's failure to acknowledge a clearance. None of the remaining 1,642 system errors could be attributed to failure to read back altitudes/vectors. Additionally, an examination of transcripts of 1 hour's actual traffic from 11 air route traffic control centers and 22 terminal facilities indicated that most pilots are consistently reading back altitudes and vectors. Furthermore, many air carriers either recommend or require that their pilots read back ATC clearances/instructions.

2

In view of these circumstances, we conclude that:

1. Rulemaking action is not warranted at this time.
2. No change to the controller's handbook (7110.65B) is required.

The FAA considers action completed on this recommendation.

Sincerely,

Original signed
by:

Langhorne Bond
Administrator

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: December 8, 1977

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-77-70 and 71

On June 16, 1977, the Federal Aviation Administration amended 14 CFR 23 and 91 to require the installation and use of shoulder harnesses on small general aviation aircraft. The amended airworthiness standards of 14 CFR 23 now require that front seats of general aviation aircraft be equipped with approved safety belts and shoulder harnesses, and the amended operating and flight rules of 14 CFR 91 require that shoulder harnesses be installed at each front seat location and be worn during takeoff and landing. These regulations, which become mandatory for flight crewmembers on all aircraft manufactured after July 18, 1978, represent a notable improvement to occupant safety.

Although the National Transportation Safety Board is encouraged by FAA's commitment to improving crash survivability, it believes that occupants of the existing fleet of fixed-wing general aviation aircraft -- over 164,000 active airplanes -- will be denied the level of protection afforded the occupants of aircraft manufactured after July 18, 1978. Furthermore, the occupants of seats other than front seats also will be denied the benefit of the impact protection afforded by shoulder harnesses.

For example, on December 2, 1976, a Beech-Debonair crashed near Glenville, New York. The aircraft cabin remained structurally intact, providing a survivable environment. However, the pilot was killed when he struck the control yoke; a broken rib punctured the pilot's heart. The Safety Board's investigation disclosed that seats did not fail and that, had the pilot been wearing a shoulder harness, upper torso rotation would have been reduced and the thoracic injury prevented.

2215

On July 12, 1975, a Piper PA-28 crashed near Leadville, Colorado. Investigation revealed that the right front seat shoulder harness was inoperative and was not being worn by the occupant, who died when he struck the control yoke and instrument panel. The occupant of the left front seat was wearing a shoulder harness and survived. The aircraft maintained a survivable occupant environment.

More recently, on August 26, 1976, a Piper PA-28 crashed near Lake City, Colorado, and on March 30, 1976, a Cessna C-340 crashed near Ruidoso, New Mexico. These accidents were similar to those cited above, in that cabin integrity was maintained but front seat occupants were killed. Moreover, it is significant that, in the Lake City PA-28 accident, the two children in aft cabin seats were fatally injured. Our investigators noted that the front seats remained virtually intact, yet the two children received severe head injuries. The circumstances of these two accidents and the occupant injuries indicate that had the occupants been wearing shoulder harnesses they would have survived.

Rec.
CY70-42

→ On August 28, 1970, the Safety Board recommended that the FAA require shoulder harnesses on all general aviation aircraft at the earliest practical date. When Notice of Proposed Rule Making (NPRM) 73-1 was issued, the Safety Board supported the proposed rule changes. However, during the rulemaking process, major portions of NPRM 73-1 were deleted. As a result, the amendments to 14 CFR 23 and 91 now require that shoulder harnesses be installed at front seat locations only and the amendments limit the requirement to aircraft manufactured after July 18, 1978. The argument against retrofitting existing general aviation aircraft with shoulder harnesses was based on the contention that a "substantial financial burden would be placed upon consumers over a short period of time" (1 year). Moreover, the installation of shoulder harnesses on other than front seats was rejected on the contention that cabin interiors can be effectively designed to protect those occupants; i.e., cabins can be "delethalized."

The Safety Board does not agree with these arguments and believes that shoulder harnesses should be installed in older aircraft and that they should be installed at all seat locations. The Safety Board believes that rejecting the retrofit aspects of NPRM 73-1 on the grounds that this would place a financial burden on consumers "over a short period of time" is not warranted. A compliance date could have been established which would have allowed aircraft owners ample time to comply without encountering a short-term financial burden. (Compliance for noise and emission standards are being handled in such a way.) Neither does the Safety Board believe that current cabin delethalization requirements will provide occupants of aft cabin seats protection comparable to occupants wearing shoulder harnesses. The Board maintains that cabin delethalization in conjunction with the use of shoulder harnesses will provide the occupants of all seats the best impact protection.

Honorable Langhorne M. Bond - 3 -

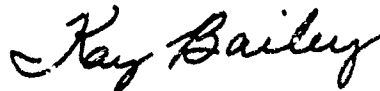
The Civil Aeronautical Authorities of both Sweden and Australia require shoulder harnesses on all general aviation airplanes before an airworthiness certificate is issued. This requirement has been in effect in Sweden since 1970 and Australia since 1973; the general aviation fleets of both countries largely consist of U. S. manufactured aircraft.

In view of the above, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Amend 14 CFR 23.785 to require installation of approved shoulder harnesses at all seat locations as outlined in NPRM 73-1. (Class II - Priority Action) (A-77-70)

Amend 14 CFR 91.33 and .39 to require installation of approved shoulder harnesses on all general aviation aircraft manufactured before July 18, 1978, after a reasonable lead time, and at all seat locations as outlined in NPRM 73-1. (Class II - Priority Action) (A-77-71)

BAILEY, Acting Chairman, McADAMS, HOGUE, and KING, Members, concurred in the above recommendations.



By: Kay Bailey
Acting Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

March 28, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, SW.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in further response to NTSB Safety Recommendations A-77-70 and 71 and your letter of December 27, 1979, concerning specific actions we have taken regarding reconsideration of shoulder harnesses for general aviation aircraft, as well as information previously requested in your letter of November 16, 1978.

The regional survey of shoulder harnesses in small airplanes mentioned in our letter of September 24, 1979, has been completed. At present, we are proceeding with a regulatory analysis in accordance with Executive Order 12044 which, when completed, will enable us to determine the proper course of action to pursue. We intend to complete this regulatory analysis not later than April 30, 1980.

We have reviewed the informal regulatory assessment made at the time of adoption of the current shoulder harness rules. Our analysis team is reassessing all aspects to satisfy the intent of Executive Order 12044 and will include a complete report of its findings in the final report. Therefore, we do not believe it would serve any useful purpose to supply the original rough assessment.

We are also in the process of updating "Technical Report No. FS-70-5922-120A, A Summary of Crashworthiness Information for Small Airplanes," to provide additional recommended guidance material to all Federal Aviation Administration regions and designers in regard to the delethalization aspects of cabin interiors.

As stated in our letter of February 15, 1979, the specific requests in your letter of November 16, 1978, for information on regulatory analysis and delethalization will be included in the aforementioned analysis, and you will be provided a detailed response when all information has been taken into account.

Sincerely,

A handwritten signature in dark ink, appearing to read "Langhorne Bond".
Langhorne Bond
Administrator



National Transportation Safety Board

Washington, D.C. 20594

Office of
Chairman

DEC 27 1979

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear Mr. Bond:

On February 1, 1979, we met to discuss Federal Aviation Administration (FAA) actions relative to shoulder harnesses in general aviation aircraft. You agreed at that meeting to reevaluate the FAA position on this matter. While we have exchanged several additional letters since your February 15, 1979, letter indicating your decision to reconsider the issues involved--the most recent being your letter of September 24, 1979--the National Transportation Safety Board continues to be concerned with the pace at which this subject is being addressed.

Because the subject of occupant protection in general aviation is of such vital importance, we are anxious to know what specific actions you have taken in your reconsideration and when a decision can be expected. We urge you to provide your decision to the Board as early as possible, and ask that you advise us of your timetable for completing your reconsideration and reaching a decision.

In the meantime, the Safety Board needs certain information previously requested for our ongoing review of this subject. Approximately one year ago (on November 16, 1978), we requested by letter that the FAA provide copies of the cost-effectiveness analysis information it used to support the decision in amendment 23-19 and 91-139 not to require the retrofit of shoulder harnesses in pre-1978 general aviation aircraft, as well as the data substantiating FAA's claim that delethalization was more effective than shoulder harnesses for all seat occupants. This information has not been provided nor has the FAA furnished any justification for the delay in providing this information. Evaluation of the cost-effectiveness analysis and supporting documentation is critical to the Board's review of the FAA's decision not to require improved safety for occupants of general aviation aircraft.

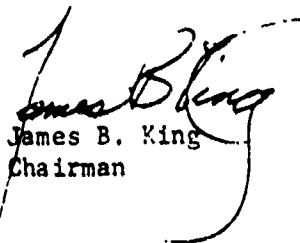
Honorable Langhorne M. Bond

- 2 -

Our November 16, 1978, letter to you also requested information about the FAA's decision to delethalize the interior of general aviation aircraft, about the criteria the FAA would use to determine if manufacturers meet this requirement, and about the methods the FAA would use to assure that the criteria were uniformly applied throughout the Regions. Again, this information has not been provided. The Safety Board, therefore, requests that you provide the requested information and a status report about the progress made to date by manufacturers to comply with this requirement.

It is essential that the Safety Board have this information in order to evaluate the combined effect of these decisions on the safety of general aviation aircraft occupants. Consequently, we ask that you provide the information requested in our November 16, 1978, letter at the earliest practicable date.

Sincerely,



James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: August 22, 1978

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-78-56 through 58

On November 6, 1977, a Semco Model T hot air balloon was involved in an accident near Mosquero, New Mexico. The National Transportation Safety Board's investigation of the accident disclosed an unsafe design characteristic associated with the gondola which should be corrected.

After a routine flight, the balloon made a normal landing approach. The landing was made in a southwesterly surface wind of 5 to 15 knots. When the balloon bounced during the landing, the gondola was turned on its side and was dragged 30 feet by the wind. When the gondola turned over, the pilot's right foot slipped off the gondola deck and was trapped between the edge of the deck and the ground. As a result, the pilot's ankle was fractured.

A similar accident occurred on January 24, 1976, near Death Valley, California, involving another Semco balloon, the Challenger AX-7. This accident resulted from an encounter with high winds and turbulence just before landing. When the pilot executed an emergency rip landing in rough terrain, the gondola turned on its side immediately after hitting the ground. The pilot's legs slipped off the deck and became trapped between the deck and the ground. The high winds dragged the gondola for 300 yards. The pilot suffered multiple compound fractures of both legs.

The gondolas on the Semco Model T and the AX-7 balloons are similar in design and construction. They have a plywood deck with tubular aluminum corner posts, rails, and diagonal supports. The gondola is enclosed by a one-piece canvas "dodger" which surrounds the structure. The dodger, when properly installed, is woven between the diagonal supports and the corner posts and the ends laced together securely. However, the dodger extends only to within 2 to 4 inches of the deck; this space between the dodger and the gondola deck allows the feet of occupants to slip through and become trapped. Furthermore, the condition of the canvas dodgers is affected by usage, age, and exposure to adverse weather conditions which can cause the canvas to stretch and work loose, thereby increasing the accident potential of this installation.

Evidence indicates that the canvas dodger in the Semco Model T accident in Mosquero, New Mexico, was improperly installed on the gondola frame. The pilot, who also owned the balloon, had removed the dodger for cleaning and had replaced it improperly. The Safety Board's review of the maintenance manual for this balloon disclosed that it did not contain instructions on the proper installation or the maintenance of the dodger.

The applicable standards governing balloons are contained in 14 CFR 31. Although these standards relate to the airworthiness of balloons, little is required in the way of maintenance information. In fact, a manufacturer's maintenance manual is not required by this Part. The Safety Board is aware of the proposed changes to 14 CFR 31 which are contained in Notice of Proposed Rule Making (NPRM) 75-31, Notice No. 8, issued on July 11, 1975. This NPRM proposes to require manufacturers to provide the necessary service, maintenance, and repair information for manned free balloons. Even though these maintenance information requirements might have provided sufficient information for the Model T owner to install the canvas dodger correctly, had they been adopted expeditiously by FAA, this design still most probably would have provided a potential hazard to the pilot.

The Safety Board has learned of corrective measures taken by one Semco Model T owner to eliminate the hazardous gap in the gondola by lashing a nylon dodger to the deck proper. This simple alteration was submitted to and approved by the FAA's Southwest Regional Office on a Major Repair and Alteration Form 337. The Board understands also that this Regional Office has been in contact with Semco Balloon, Inc., concerning their gondola design.

Ballooning is a rapidly growing sport in the United States. There were only 158 certificated hot air balloons in 1973; as of December 1976, there were 824 certificated balloons -- more than a five-fold increase. The Board's accident data indicate that in the past 4 years, 11 balloon accidents have resulted in 1 fatality and 17 injuries.

In view of the above, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue an Airworthiness Directive to require means for securing the canvas dodger to the deck or require other means for eliminating the existing gap between the dodger and the deck on Semco Model T and Challenger AX-7 balloons. (Class II - Priority Action) (A-78-56).

Amend 14 CFR 31.59 to require that baskets, gondolas, or other enclosures for occupants of manned free balloons be designed to prevent lower extremities from protruding from the provided enclosure when the enclosure is subjected to the test conditions outlined in 14 CFR 31.27(c). (Class II - Priority Action) (A-78-57).

Expedite the adoption of the 14 CFR 31 rule changes contained in NPRM 75-31, specifically in regard to the requirements for a Manual of Instructions for Continued Airworthiness which is proposed in Appendix A of these rule changes. (Class II - Priority Action)(A-78-58).

KING, Chairman, McADAMS, HOGUE and DRIVER, Members, concurred in the above recommendations.


By: James B. King
Chairman



National Transportation Safety Board

Washington, D.C. 20594

January 29, 1980

Office of
Chairman

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Bond:

Thank you for your recent response of January 4, 1980, regarding the reconsideration of recommendations A-78-56 and A-78-57, which were issued as the result of a Semco Model T hot air balloon accident near Mosquero, New Mexico, on November 6, 1977.

The National Transportation Safety Board was pleased to learn of the General Aviation Airworthiness Alert (AC 43-16) issued by the Federal Aviation Administration (FAA) in August 1979, after reconsidering recommendation A-78-56, which called for an Airworthiness Directive (AD) requiring a means of securing the canvas siding to the gondola floor. Since your reply also stated that the recommended AD was being issued, we have classified A-78-56 as "Open--Acceptable Action" until the AD becomes effective.

Safety recommendation A-78-57 called for regulatory changes to 14 CFR 31 which would require that occupant enclosures for manned free balloons be designed to prevent protrusion of lower extremities under test conditions of 14 CFR 31.27(c). Your recent decision to include this recommendation as part of the FAA's current review of 14 CFR 31 has caused us to classify your reply to this recommendation "Open--Acceptable Action." The recommendation will remain open until the results of the regulatory review can be evaluated by our staff.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "James B. King".

James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

January 4, 1980

Honorable James B. King
Chairman, National Transportation Safety Board
800 Independence Avenue, S.W.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to your letter of February 22 which requests reconsideration of the Federal Aviation Administration position with respect to NTSB Safety Recommendations A-78-56 and 57.

A-78-56. Issue an Airworthiness Directive to require means for securing the canvas dodger to the deck or require other means for eliminating the existing gap between the dodger and the deck on the Semco Model T and Challenger AX-7 balloons.

Comment. We have issued a General Aviation Airworthiness Alert (AC 43-16) which was published in the August 1979 issue (copy enclosed). Also, the certification responsibility for the Semco Model T, TC-4A, and Challenger AX-7 balloons has been recently transferred to the FAA Eastern Region. They are issuing an Airworthiness Directive requiring a modification to eliminate the existing gap between the canvas siding and the deck on these balloon models.

A-78-57. Amend 14 CFR 31.59 to require that baskets, gondolas, or other enclosures for occupants of manned free balloons be designed to prevent lower extremities from protruding from the provided enclosure when the enclosure is subjected to the test conditions outlined in 14 CFR 31.27(c).

Comment. The test required by CFR 31.27(c) is a strength test and does not take human factors into account. We are currently reviewing 14 CFR 31 and will include this recommendation as part of that review.

Sincerely,

A handwritten signature in dark ink, appearing to read "Langhorne Bond".

Langhorne Bond
Administrator

Enclosure

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: October 18, 1978

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-78-77 and 78

On September 25, 1978, Pacific Southwest Airlines Flight 182 and a Cessna 172, N7711G, collided in midair over San Diego, California. Flight 182 was on an instrument flight rules flight plan and had been cleared for a visual approach to runway 27 at Lindbergh Airport. The Cessna, which was on a visual flight rules (VFR) flight plan, had completed a practice instrument landing system approach to runway 9 at Lindbergh Airport and was proceeding northeast. When the collision occurred Flight 182 was communicating with Lindbergh tower, while the Cessna was communicating with the Miramar Radar Air Traffic Control Facility (RATCF).

Investigation has revealed that a Terminal Radar Service Area (TRSA) with Stage III service (radar sequencing and separation service for VFR aircraft) had been established at Miramar Naval Air Station, the primary airport in the San Diego, California, terminal area. Only Stage II service (radar advisory and sequencing for VFR aircraft) is available at Lindbergh Airport, which is classified as a secondary airport. Because of the mixture of air carrier and general aviation aircraft operating in and out of Lindbergh Airport, the Safety Board believes that a TRSA should be implemented for that airport so that other users can benefit from the same level of air traffic control service as is afforded military flights in the San Diego terminal area.

We realize that a TRSA may not have prevented the midair collision between Flight 182 and N7711G since visual separation is still being used in all terminal areas. Nevertheless, we believe that a TRSA would lessen the probability of a midair collision and would be a logical first step toward equalizing the ATC services available to all users of airspace in the San Diego terminal area.


2503

Consequently, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Implement a Terminal Radar Service Area (TRSA) at Lindbergh Airport, San Diego, California. (Class I - Urgent Action) (A-78-77)

Review procedures at all airports which are used regularly by air carrier and general aviation aircraft to determine which other areas require either a terminal control area or a terminal radar service area, and establish the appropriate one. (Class II - Priority Action) (A-78-78)

KING, Chairman, DRIVER, Vice Chairman, McADAMS and HOGUE, Members, concurred in the above recommendation.


By: James B. King
Chairman



National Transportation Safety Board

Washington D.C. 20594

Office of the
Chairman

July 3, 1979

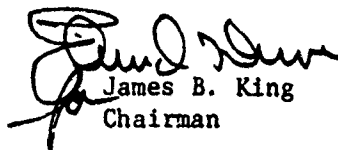
Honorable Langhorne Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Bond:

Thank you for your letter of May 29, 1979, responding to recommendations A-78-77 and A-78-78. These recommendations stemmed from the midair collision between a Pacific Southwest Airlines B-727 and a Cessna 172 over San Diego, California, on September 25, 1978. In A-78-77, the Safety Board recommended that the Federal Aviation Administration (FAA) establish a Terminal Radar Service Area (TRSA) at Lindbergh Airport, San Diego, California. We are pleased to note that a TRSA has been established. The status of this recommendation is now classified as "Closed--Acceptable Action."

In A-78-78, the Safety Board recommended that the FAA review procedures at all airports to determine which other areas require either a Terminal Control Area (TCA) or a TRSA and to establish the appropriate one. We have examined FAA's "Plan for Enhanced Safety of Flight Operations in the National Airspace System," which describes in detail plans for 4 additional TCAs and 80 new TRSAs within the next 4 to 5 years. We have noted many related projects in the plan to minimize the midair collision problem. We appreciate the many actions underway toward fulfillment of this recommendation and request that we be kept periodically advised of their progress. The status of this recommendation is classified as "Open--Acceptable Action."

Sincerely yours,


James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

May 29, 1979

Honorable James B. King
Chairman, National Transportation Safety Board
800 Independence Avenue, S. W.
Washington, D. C. 20594

Dear Mr. Chairman:

The following information updates the action taken by the Federal Aviation Administration (FAA) concerning NTSB Safety Recommendations A-78-77 and A-78-78.

Recommendation A-78-77. Implement a Terminal Radar Service Area (TRSA) at Lindbergh Airport, San Diego, California.

Comment. A TRSA was implemented at Lindbergh Airport, San Diego, California, on April 19. In addition, the airport traffic control tower has been equipped with the following:

BRITE Alphanumerics - commissioned 1/22/79

Minimum Safe Altitude Warning and Conflict Alert
Enhancements - commissioned 2/14/79

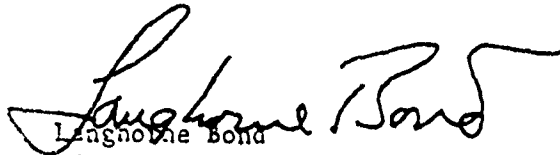
Recommendation A-78-78. Review procedures at all airports which are used regularly by air carrier and general aviation aircraft to determine which other areas require either a terminal control area or a terminal radar service area and establish the appropriate one.

Comment. In our letter of December 27, 1978, we informed your office that the FAA's program to expedite the on-going TRSA establishment program at all air carrier airports, where capability exists, was well underway and that a Notice of Proposed Rule Making (NPRM) concerning establishment of additional Terminal Control Areas (TCA) was to be issued prior to January 1, 1979. This NRPM (Docket 18605) was issued January 4. See Enclosure 1.

As a matter of information, I have enclosed a copy of FAA's "Plan for Enhanced Safety of Flight Operations in the National Airspace System" which describes in detail our action for the establishment of additional TCAs and TRSAs with the proposed implementation dates. See Enclosure 2.

The FAA considers action completed with regard to these two recommendations.

Sincerely,


L. B. Bond
Administrator

Enclosures

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

December 27, 1978

Honorable James B. King
Chairman, National Transportation Safety Board
800 Independence Ave., S.W.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to your October 18 letter concerning the Federal Aviation Administration's (FAA) action relating to NTSB Recommendations A-78-77 and A-78-78.

Recommendation A-78-77. Implement a Terminal Radar Service Area (TRSA) at Lindbergh Airport, San Diego, California.

Comment. A TRSA serving the Lindbergh Field Airport is currently being established. Projected target date for implementation is May 1, 1979.

Recommendation A-78-78. Review procedures at all airports which are used regularly by air carrier and general aviation aircraft to determine which other areas require either a terminal control area or a terminal radar service area, and establish the appropriate one.

Comment. A program is well underway to expedite the on-going TRSA establishment program at all air carrier airports, where capability exists. A Notice of Proposed Rule Making (NPRM) concerning establishment of additional terminal control areas will be issued prior to January 1, 1979.

We will advise you of further action taken as it occurs.

Sincerely,


Langhorne Bond
Administrator

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: September 6, 1979

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-79-68 through -70

The National Transportation Safety Board's investigation of the Rocky Mountain Airlines DeHavilland DHC aircraft accident near Steamboat Springs, Colorado, on December 4, 1978, illustrated the immediate need for survival training for crewmembers and for the installation of shoulder harnesses on crew seats. 1/

Survival Training

The accident occurred in near-blizzard conditions about 1945 m.s.t. in mountainous terrain at the 10,500-ft. level. The first emergency rescue team arrived at the accident site about 10 hours later; the evacuation was completed 16 hours after the accident. Falling and blowing snow, strong winds, rugged terrain, darkness, and subfreezing temperatures hampered the search and rescue efforts.

There was a great potential for serious postcrash trauma, including hypothermia and frostbite. The aircraft occupants were extremely fortunate, however, to have among them a passenger trained in winter survival techniques, who acted promptly and appropriately and, with the few available resources, saved the lives of many of the passengers. Only 1 of the 20 passengers and 1 crewmember died as a result of this accident; 1 crewmember sustained minor frostbite.

1/ For more detailed information, read: "Aircraft Accident Report, Rocky Mountain Airways, Inc., DeHavilland DHC-6 Twin Otter, N25RM, near Steamboat Springs, Colorado, December 4, 1978." (NTSB-AAR-79-6).

2637B

A review of the Federal Aviation Regulations regarding crewmember emergency training revealed that crewmembers are required to be knowledgeable about methods and procedures to cope with in-flight emergencies, evacuations, and ditchings. However, this training does not extend to postcrash survival problems outside the aircraft. The actions taken by this passenger were the responsibility of the crewmembers. The Safety Board believes that appropriate training should be provided so that crewmembers can cope with these situations.

The Board learned that the FAA requires survival training for its own crewmembers as outlined in Section 261 of FAA Handbook 4040.9, "General Manual for Operation of FAA Aircraft." Courses are provided by the Civil Aeromedical Institute (CAMI). We believe that the existing information and programs could be adapted easily for commercial operators.

Shoulder Harnesses

The Board's investigation established that shoulder harnesses, if worn by the crewmembers, might have reduced their injuries.

The new 14 CFR 135, which became effective December 1, 1978, specifies the installation of shoulder harnesses at flightcrew stations of certain commuter aircraft by June 1, 1979, with provisions for the granting of extensions to December 1, 1980, to individual operators.

The Safety Board believes that the June 1 date allowed adequate time for most operators to comply. However, the Safety Board recognizes that a few operators had to develop Supplemental Type Certificates for certain older aircraft and that some operators have encountered supply problems beyond their control. In these few cases, extensions may be necessary, but it is inconceivable that many operators would require more than the initial 6 months of lead time for compliance. The Board believes that compliance with the requirements of 14 CFR 135.171 should be strictly enforced.

In view of the above, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Amend 14 CFR 135.331 and 121.417 to require that each certificate holder provide a survival training program for its crewmembers that would include the basic information on sea, desert, winter, and mountain survival.
(Class II - Priority Action) A-79-68)

Honorable Langhorne M. Bond

- 3 -

Issue an Advisory Circular which outlines acceptable means of compliance with such a survival training program requirement. (Class II - Priority Action) (A-79-69)

Strictly enforce the compliance date for the installation of shoulder harnesses as required by 14 CFR 135.171. (Class II - Priority Action) (A-79-70)

KING, Chairman, DRIVER, Vice Chairman, McADAMS and GOLDMAN, Members, concurred in these recommendations. BURSLEY, Member, did not participate.


By: James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

March 11, 1980

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, SW.
Washington, D.C. 20594

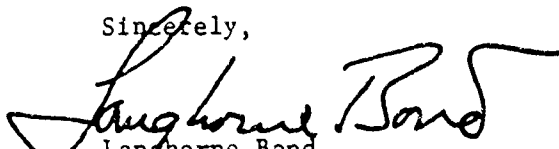
Dear Mr. Chairman:

This is in response to your letter of January 4 requesting a summary of extensions granted by the Federal Aviation Administration (FAA) in relation to NTSB Safety Recommendation A-79-70. The recommendation called for strict enforcement of the compliance date for shoulder harness installation required by 14 CFR 135.171.

Enclosed is a listing of air taxi operators that were granted extensions of the June 1, 1979, installation compliance date for shoulder harness requirements which was required by 14 CFR 135.10. All requests for an extension of this date were required because of non-availability of shoulder harness kits by vendors or manufacturers prior to June 1, 1979. In three cases, requests were made after June 1, for reasons noted.

I trust that the above information and the enclosed listing of air taxi operators will fulfill the Board's request.

Sincerely,


Langhorne Bond
Administrator

Enclosure

Shoulder Harness Installation Listing

| Operator | Date of Request | Scheduled Date of Compliance | Reason for Late Filing |
|---|-----------------|------------------------------|----------------------------------|
| 1. Air Wisconsin, Appleton, WI | 4/19/79 | 11/30/79 | |
| 2. Air U.S., Denver, CO | 5/31/79 | 7/30/79 | |
| 3. Air North, Burlington, VT | 5/10/79 | 12/31/79 | |
| 4. Aeromech Commuter, Clarksburg, WVA | 5/21/79 | 12/31/79 | |
| 5. Air New England, E. Boston, MA | 5/24/79 | 6/15/79 | |
| 6. American Jet, Chesterfield, MO | 5/31/79 | 10/30/79 | N/A |
| 7. Alpha Aviation, Dallas, TX | 6/13/79 | 9/1/79 | Scheduled shpmt. of kits not met |
| 8. Altair Airlines, Inc., Philadelphia, PA | 5/14/79 | 9/30/79 | N/A |
| 9. Antilles Air Boats, Inc., Virgin Islands | 5/25/79 | 11/1/79 | N/A |
| 10. American Jet, Chesterfield, MO | 9/26/79 | 10/30/79 | 2 Lears added |
| 11. Christler Flying Svc., Thermopolis, WY | 5/31/79 | 12/31/79 | N/A |
| 12. Cumberland Airlines, Cumberland, MD | 6/1/79 | 12/1/79 | N/A |
| 13. Crown Airways, Inc., Falls Creek, PA | 5/23/79 | 7/31/79 | N/A |
| 14. Commandair, Carlsbad, CA | 5/29/79 | 12/1/79 | N/A |
| 15. Commuter Airlines, Inc., Binghamton, NY | 5/17/79 | 12/31/79 | N/A |
| 16. Command Airways, Wappinger Falls, NY | 5/18/79 | 9/30/79 | N/A |
| 17. Connie Kaletta Svc, Inc., Ypsilanti, MI | 5/25/79 | 9/30/79 | N/A |
| 18. Cardinal/Air Virginia, Lynchburg, VA | 5/31/79 | 9/30/79 | N/A |
| 19. Eagle Aviation, Inc., Houston, TX | 5/31/79 | 8/31/79 | N/A |
| 20. Golden West Airlines, Newport Beach, CA | 5/23/79 | 12/31/79 | N/A |
| 21. Golden Jet Airways, Los Angeles, CA | 5/30/79 | 9/1/79 | N/A |
| 22. Kennedy Flite Center, Sandston, VA | 5/30/79 | 8/31/79 | N/A |
| 23. McInerney Leasing, Inc., Oak Park, MI | 5/24/79 | 11/30/79 | N/A |
| 24. McInerney Leasing, Inc., Oak Park, MI | 11/30/79 | 12/5/79 | Need more time to install kits |
| 25. Mississippi Valley Airlines, LaCrosse, WI | 5/1/79 | 9/30/79 | N/A |
| 26. Prinair, Isla Valley, PR | 3/29/79 | 10/1/79 | N/A |
| 27. Pocono Airlines, Avoca, PA | 5/17/79 | 11/30/79 | N/A |
| 28. Pilgrim Airlines, New London, CT | 5/23/79 | 9/30/79 | N/A |
| 29. Rocky Mountain Airways, Denver, CO | 5/17/79 | 10/30/79 | N/A |
| 30. Scutti Leasing, Inc., Rochester, NY | 5/21/79 | 10/30/79 | N/A |
| 31. Suburban Airlines, Inc., Reading, PA | 5/21/79 | 10/31/79 | N/A |
| 32. Trans Catalina Airlines, Santa Ana, CA | 5/23/79 | 8/31/79 | N/A |
| 33. U.S. Airways, Ypsilanti, MI | 5/25/79 | 9/30/79 | N/A |
| 34. Zia Airlines, Las Cruces, NM | 5/25/79 | 12/31/79 | N/A |
| 35. Chautauqua Airlines, Inc., Jamestown, NY | 5/24/79 | 11/30/79 | N/A |



National Transportation Safety Board

Washington, D C 20594

Office of
Chairman

January 4, 1980

Honorable Langhorne Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Bond:

This is to acknowledge the Federal Aviation Administration's (FAA) letter of December 5, 1979, in response to the National Transportation Safety Board's safety recommendations A-79-68, 69, and 70 issued as a result of the Rocky Mountain Airlines DeHavilland DHC which crashed at Steamboat Springs, Colorado, on December 4, 1978.

The Safety Board recommended that the FAA amend 14 CFR 135 and 121 to require a survival training program for crewmembers that would include sea, desert, winter, and mountain survival (A-79-68); issue an Advisory Circular which outlines acceptable means of compliance with survival training requirements (A-79-69); and strictly enforce the compliance date for installation of shoulder harnesses as required by 14 CFR 135.171 (A-79-70).

The FAA's response to A-79-68 and 69 indicated agreement, in principle, with the need for crewmember survival training. We noted that rather than making a regulatory change, FAA plans to issue an Air Carrier Operations Bulletin (ACOB) within 90 days, which will require inspectors to assure that carriers include survival training, appropriate to route structure, in recurrent crewmember training. Since the ACOB will also include a suggested outline for a survival training program, we have classified the response to recommendations A-79-68 and 69 as "Open--Acceptable Alternate Action" until the bulletin is issued and reviewed by the Safety Board staff.

In response to A-79-70, which called for strict enforcement of the compliance date for shoulder harness installation required by 14 CFR 135.171, the FAA stated that compliance date extensions, beyond June 1, 1979, were logical in view of the supply problem and were not being abused. However, the response did not include any supporting information pertaining to the number of extensions being granted or the extent of the supply problem. We would appreciate receiving a summary of extensions

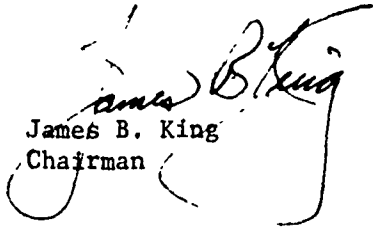
Honorable Langhorne Bond

- 2 -

granted by the FAA which shows the name of the operator; the date of the request; the reason for the request; the scheduled date of compliance; and in cases when the extension was requested after June 1, 1979, the reasons for late filing.

Until such information is made available for review, A-79-70 will be classified as "Open--Unacceptable Action."

Sincerely yours,


James B. King
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591



OFFICE OF
THE ADMINISTRATOR

December 5, 1979

Honorable James B. King
Chairman, National Transportation
Safety Board
800 Independence Avenue, S. W.
Washington, D. C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendations A-79-68 through 70.

A-79-68. Amend 14 CFR 135.331 and 121.417 to require that each certificate holder provide a survival training program for its crewmembers that would include the basic information on sea, desert, winter, and mountain survival.

Comment. We do not believe that a regulatory amendment, as recommended, is appropriate at this time. We do agree, however, that crewmembers should be knowledgeable in survival techniques for the various environmental conditions that may be encountered following an air carrier accident.

To initiate training as soon as practical, we plan to issue an Air Carrier Operations Bulletin (ACOB), within the next 90 days, instructing our principal operations inspectors to have their assigned air carriers include survival training, as appropriate to the carrier's route structure, during the crewmembers' recurrent training.

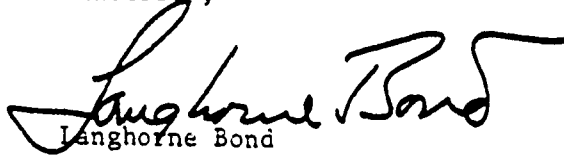
A-79-69. Issue an Advisory Circular which outlines acceptable means of compliance with such a survival training program requirement.

Comment. As discussed in A-79-68 above, an Air Carrier Operations Bulletin instead of an Advisory Circular is more appropriate at this time. We plan to include a suggested outline for a survival training program in this Air Carrier Operations Bulletin.

A-79-70. Strictly enforce the compliance date for the installation of shoulder harnesses as required by 14 CFR 135.171.

Comment. This agency's action of granting certain operators extensions to the shoulder harness requirement under Part 135 is a logical solution to a supply problem. We are not aware of any abuses by operators in delaying the installation of shoulder harnesses in their aircraft.

Sincerely,


Langhorne Bond
Administrator

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: January 11, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-1 and -2

On March 10, 1979, Swift Aire Lines, Inc., Flight 235, an Aerospatiale Nord 262, ditched in Santa Monica Bay after experiencing the loss of both engines shortly after takeoff from Los Angeles International Airport, California.

After liftoff from runway 24L, the right propeller autofeathered, and the right engine shut down. Seconds later the pilot apparently misidentified the failed engine and inadvertently shut down the left engine.

During its investigation, the National Transportation Safety Board found evidence that indicated the pilots were not able to restart the left engine because they had failed to place the propeller lever in the feather position. Propeller feathering is necessary before an engine can be restarted successfully on the Nord 262 aircraft.

At the time of the accident, there was no guidance in the company's Nord 262 operations manual indicating the urgency of setting the propeller control lever at "feather" while performing the post-autofeather procedure in order to perform a successful engine restart. After the accident, this deficiency was corrected in Swift Aire's operations manual; however, to our knowledge, no other Nord 262 operators have initiated manual changes of this nature.

The Safety Board believes this accident might have been prevented had the flightcrew been aware of the need to place the propeller lever in the feather position after engine shutdown since sufficient time was available for a successful restart.

2721-A

During its investigation of the Swift Aire accident, the Safety Board also learned that during cold weather operations Ransome Airlines had experienced numerous autofeather problems during Nord 262 engine runups and ground rolls for takeoff. Corrective action for some of these incidents required draining water from the autofeather propeller pressure hose.

As a result of these autofeather problems, Ransome Airlines initiated a requirement for engine runups and autofeather checks before the first flight of the day when the air temperature is below 0° C. This procedure reportedly has greatly reduced the number of autofeather problems previously experienced by this airline.

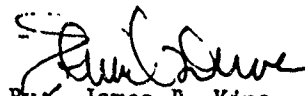
The use of this procedure indicates to the pilot that there is no blockage of the propeller feathering system, and it also minimizes an inadvertent activation of the autofeather system during takeoff which could be caused by trapped pressure in the airframe pitot system.

Accordingly, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require changes to the Nord 262 operations manuals that (1) alert the flightcrew to the fact that an airborne engine restart is not possible unless the propeller has been feathered; and (2) provide guidance to the flightcrew regarding the urgency of completing the full engine shutdown procedure after the loss of an engine. (Class II, Priority Action) (A-80-1)

Require a change to the Nord 262 operations manuals that specifies an engine runup and autofeather check before any flight when the air temperature is below 0° C. (Class I, Priority Action) (A-80-2)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.


By James B. King
Chairman

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.**

ISSUED: January 10, 1980

Forwarded to:

Honorable Langhorne Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-3 and-4

On May 30, 1979, a Tennessee Airways Cessna 402, N87280, being operated as an air taxi, was in cruising flight when the pilot felt a "shudder" in the airframe. He reduced power and as the airspeed slowed to 110 mph the shudder stopped. The pilot diverted the flight to Shelbyville, North Carolina, and during the landing approach, with the landing gear down and full flaps extended, the shudder began again at 95 mph and continued throughout the landing. Examination of the aircraft revealed that the elevator trim tab actuator jackscrew, Part Number 1260074-4, could be moved in and out without rotating it.

The trim tab actuator assembly was taken to Cessna Aircraft Company, Wichita, Kansas, and examined. Examination revealed that the jackscrew o-ring packing had deteriorated and the jackscrew threads were rusted and badly worn because of a lack of lubrication.

The Service Manual requires a trim tab "free play" inspection every 100 hours. However, the condition of the packing is not ascertained during this inspection procedure. The interval between actuator lubrication is 1,500 hours; this long interval is adequate only if the packing remains in good condition. Examination of the aircraft records indicated that the total aircraft time was 2,042 hours. The Safety Board could not determine when the actuator was last lubricated.

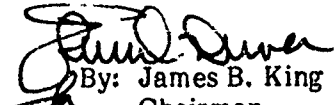
A check of service difficulty records showed four other possible cases of this type of distress on Cessna model 402 aircraft. In addition, the Safety Board understands that similar actuators are used in the aileron and rudder systems on this aircraft and on other Cessna aircraft.

Since a divergent tail flutter with subsequent aircraft damage can be caused by a free tab, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Inform all operators about the possibility and effects of a deteriorated o-ring packing on trim tab actuators on Cessna aircraft in General Aviation Airworthiness Alerts, Advisory Circular 43-16. (Class II, Priority Action) (A-80-3)

Review the present inspection criteria for inspection and lubrication of the elevator trim tab actuators and other similar actuators on Cessna 402's and prescribe more stringent criteria if they are not adequate to prevent failure of the actuator due to corrosion or inadequate lubrication. (Class II, Priority Action) (A-80-4)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.


By: James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: January 11, 1980

Forwarded to:

Honorable Langhorne Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-5 through -7

During 1978 there were at least 19 accidents or incidents involving various models of high wing Cessna aircraft in which engine power was lost because of water in the fuel. Many of these are documented at the FAA's Maintenance Analysis Center in Oklahoma City.

Typical of these is an accident which occurred at Cape Girardeau, Missouri, on August 30, 1978. The Cessna 182 crashed while maneuvering for an emergency landing after loss of engine power. The investigation revealed water in both the carburetor and fuel strainer. This model airplane had the fuel strainer drain control knob located inside the cabin so that the operator could not see the fuel as it was drained. Also there were no quick-drain valves installed in the sumps. The pilot stated that he "drained the strainer three times"; however, it was apparent that he did not have a full understanding of the proper way to eliminate water from the fuel lines and sumps.

Owners manuals for Cessna 150, 172, 182, 210 for model years from 1957 to 1977 were reviewed. This review showed that there are inadequate instructions and descriptions as to the proper method of eliminating water from the fuel system.

The Safety Board discussed fuel contamination in some detail in its 1974 Special Study of General Aviation Accidents Involving Fuel Starvation. At that time, the Safety Board made recommendations to the Federal Aviation Administration (A-74-35 and A-74-36) directed to making more specific, detailed information available to pilots. Both the FAA and the General Aviation Manufacturers Association (GAMA) agreed with the intent of the recommendations. However, except for the reissuance of Advisory Circular 20-43C in October 1976 in limited distribution, the Safety Board is not aware of any effort on the part of either FAA or the manufacturers to make such information available.

The Safety Board believes that Advisory Circular 20-43C presents the kind of explanation and details which pilots need in order to properly purge water

2798

from their airplane's fuel systems. We also believe that the same type of information should be provided in Airplane Flight Manuals or Owner's manuals.

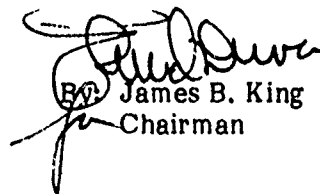
Accordingly, the Safety Board recommends that the Federal Aviation Administration:

Distribute among general aviation pilots and operators the information in Advisory Circular 20-43C concerned with eliminating water from fuel. (Class II, Priority Action) (A-80-5)

Require that all Accident Prevention Specialists in FAA District Offices make elimination of water from fuel systems an item for special emphasis in their contacts with general aviation pilots and operators. (Class II, Priority Action) (A-80-6)

Require that Cessna include in Pilots Operating Handbooks or Flight Manuals for all its aircraft models a detailed discussion of, and specific instructions for, the detection and elimination of water from the fuel systems of these aircraft. (Class II, Priority Action) (A-80-7)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.


By James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: January 21, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-8

On April 4, 1979, a Trans World Airlines B-727 entered a high-speed spiral dive while cruising at 39,000 feet (FL390) near Saginaw, Michigan. The aircraft did not recover from the dive until the aircraft reached an altitude between 5,000 and 6,000 feet m.s.l. despite flightcrew actions to counteract the maneuver. The aircraft was then landed under emergency conditions at an alternate airport. The aircraft was damaged extensively, and the No. 7 leading edge slat on the right wing, the No. 10 spoiler panel, and several other components were missing.

During its investigation, the Safety Board examined the effects of full extension of the No. 7 slat on aircraft performance and control during level flight and descent. Using a Boeing engineering simulator, it was determined that the extended slat will generate a right roll which will be countered by the autopilot until its roll authority is exceeded. At the onset, the roll is readily recognizable and controllable as long as lateral controls are used with minimal delay and only to the extent needed to return the aircraft to a wings-level attitude. If the application of corrective controls is delayed and then used to full travel, an uncontrollable, steep descending spiral will develop. This occurs at certain Mach number and angle of attack relationships where the extended slat generates rolling moments that exceed the control authority available to the pilot. The spiral will continue until Mach number and angle of attack values are reduced or until the slat separates from the aircraft. The simulation results confirm the flightcrew's description of the spiral dive and the loss of roll control until the slat separated from the aircraft. Under certain conditions, recovery would not be possible.

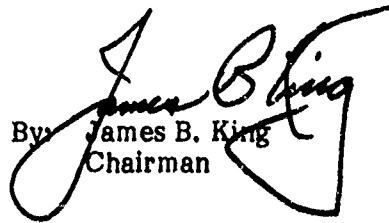
The Safety Board believes that an extended No. 7 slat precipitated control problems that culminated in a loss of control. The Safety Board is also aware of TWA Safety Bulletin 79-3 and Boeing Operations Manual Bulletin 75-7 that, to a degree, inform flightcrews of the recognition and control aspects of an asymmetric slat configuration. The Safety Board believes that flightcrews must be able to recognize and react to such a condition and that there is a need to more widely disseminate comprehensive guidance to flightcrews.

2629B

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration in cooperation with the Boeing Company:

Disseminate to all Boeing 727 operators and flightcrews information of the type included in Boeing Operations Manual Bulletin 75-7 and TWA Flight Operations Safety Bulletin 79-3 which address control problems associated with high-speed asymmetrical leading edge slat configuration on B-727 aircraft. (Class II, Priority Action) (A-80-8)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in the above recommendation.


By: James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: January 23, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-80-9 and 10

On December 15, 1979, a Hughes 269C helicopter crashed 2 miles west of West Milton, Ohio, fatally injuring the pilot who was the only person on board the aircraft.

Preliminary investigation has indicated that an in-flight separation of the tailboom occurred at the P/N 269A2324-7 tailboom center attach fitting. The center attach fitting broke into more than three pieces that separated with the left and right tailboom support struts. The forward end of the fitting was attached to the tailboom tube by 16 rivets, with 8 rivets on each side of the fitting centerline. Fracture of the P/N 269A2324-7 fitting occurred in the web portion between the forward center portion and the left and right ends, incorporating the first three rivets forward on the left side and the second through fifth rivets forward on the right side. A preliminary metallurgical examination of the fitting fracture disclosed evidence of a large preexisting fatigue crack through approximately 90 percent of the left side fracture. High cycle, low stress fatigue crack initiations occurred at the intersection of the rivet holes and top surface of the web which mates with the tailboom tube, at the top surface of the web at the forward faying surface of the tailboom tube, and at the top surface of the flange in the forward center section of the fitting between the strut lugs. The fracture on the right side of the fitting showed evidence of a high stress, low cycle fatigue crack initiating in the web just forward of the rivets. Initiation of the right side fatigue crack was along the faying surface adjacent to the tube with fatigue progression through the fitting web thickness in the downward direction. The right side fracture appeared secondary to the left side fracture. Metallurgical examination of this component is continuing.

2850

The accident aircraft, N7483F, S/N 584, had an upgraded P/N 269A2324-7 tailboom center attach fitting which had been redesigned with increased thickness in the forward lugs to make it less susceptible to cracks and structural damage than the original fitting P/N 269A2324 design. Hughes Service Information Notice (HSIN) No. N-82.3, dated September 19, 1977, prescribed an inspection of the center section fitting and other fittings in the area of the lugs but expressly states that the redesigned P/N 269A2324-7 fitting (factory equipped on all model 269C helicopters) is not subject to that notice. Moreover, HSIN No. N-82.3 does not pertain to any model 269C having a serial number greater than 569 and, therefore, was totally inapplicable to the accident aircraft.

FAA Airworthiness Directive 76-18-01, Amendment 39-2707, required inspection of the P/N 269A2324 fittings but excludes any examination of the redesigned P/N 269A2324-7 fittings. Therefore, no inspection requirements by airworthiness directive or HSIN exist for the P/N 269A2324-7 fitting.

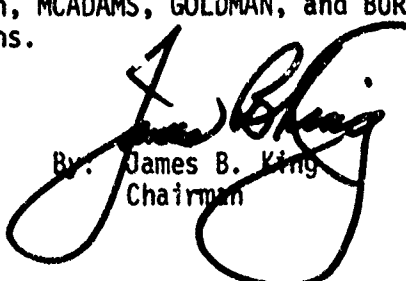
Separation of the P/N 269A2323-7 fitting will result in loss of the helicopter flight controllability.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require an immediate inspection of all tailboom center section fittings, P/N 269A2324-7, installed in Hughes model 269 helicopters for evidence of cracks. (Class I, Urgent Action) (A-80-9)

Establish a schedule for recurring inspections of that fitting based on an appropriate number of operating hours. (Class I, Urgent Action) (A-80-10)

KING, Chairman, DRIVER, Vice Chairman, MCADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.


By: James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

ISSUED: February 5, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-11

On September 29, 1979, a Cessna Model 120, N72504, crashed near Vicksburg, Mississippi, after the right wing separated in flight. Both persons aboard, an instructor pilot and his student, were killed.

Investigation disclosed that the wing separated when the forward wing strut, upper rod-end spherical fitting failed. Metallurgical examination disclosed that the fitting was severely pitted and corroded. The fitting apparently had become pitted and corroded over a long period of time and, at the location of failure, corrosion was found to have penetrated almost the entire thickness of the fitting.

The airplane involved was manufactured in 1946, and was last inspected in February 1979. Although the external location of the spherical fitting makes it physically and visually accessible, evidence of corrosive deterioration, cracking, or elongation apparently was not detected during the inspection. Paint, which covered the lower portion of the fitting in the area of the failure, may have partially obscured the corrosion.

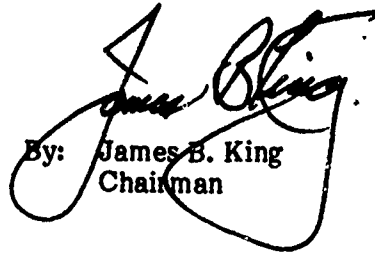
Wing strut fittings similar to the one which failed are also installed on many Cessna Model 140 airplanes. As of December 31, 1978, a total of 3,486 Cessna Model 120/140 aircraft were registered with the Federal Aviation Administration, the newest of which are approaching 30 years in service.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue an Airworthiness Directive applicable to the Cessna Model 120 and 140 airplanes, requiring an immediate inspection of wing strut upper rod-end spherical fittings for corrosion, cracking, or elongation. If any of these conditions are detected, the fittings should be replaced before further flight. (Class I — Urgent Action) (A-80-11)

2866

KING, Chairman, DRIVER, Vice Chairman, McADAMS and BURSLEY, Members, concurred in this recommendation. GOLDMAN, Member, did not participate.


By: James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: February 6, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-12

Recently, the National Transportation Safety Board received a copy of a letter sent by an air carrier check pilot to a Federal Aviation Administration operations inspector. The letter described certain potentially critical flight characteristics of the deHavilland Twin Otter, DHC-6 airplane, which involve the proper pitch attitude and airspeed during go-around maneuvers in the short takeoff and landing full-flap configuration.

A go-around or balked landing in the DHC-6 with full-flaps (37 1/2°) must be performed with the nose below the horizon, avoiding rotation of the nose of the airplane above the horizon. An excessive initial pitch attitude or a very rapid pitch change, or both, results in rapid deterioration of airspeed, a stall and a loss of control. The nose of the airplane must be kept below the actual flightpath until the flaps have been retracted.

A DHC-6 pilot accustomed to conventional nose-high pitch attitudes during go-around may not be fully appreciative of or familiar with the relatively nose-low, short takeoff and landing pitch requirements of the DHC-6 during a full-flap go-around. Currently, there is no precautionary or instructive material in the DHC-6 flight manual relating specifically to this phase of flight. DeHavilland Aircraft of Canada, Ltd., has informed the Safety Board of its intention to provide such supplemental information in the manual in the near future. However, according to the Ministry of Transport, Canada, the certifying authority for the DHC-6, some flight testing of the airplane will be required before the new information is approved.

In the interim, the Safety Board believes that all DHC-6 operators should be advised explicitly of the unique and critical pitch attitude requirements during a full-flap go-around and of the need to maintain the recommended go-around airspeed. The Safety Board, therefore, recommends that the Federal Aviation Administration:

2865

Immediately notify all DHC-6 operators of the aircraft's unique operational requirements during a full-flap go-around, and of the need for maintaining a nose-down airplane pitch attitude and adequate airspeed during this phase of flight. (Class II, Priority Action) (A-80-12)

KING, Chairman, DRIVER, Vice Chairman, McADAMS and BURSLEY, Members, concurred in this recommendation. GOLDMAN, Member, did not participate.

By:  James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: February 13, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-13 and -14

On March 1, 1979, a Beech 70 Excalibur Conversion (Queen Air), N777AE, crashed just after takeoff from the Gulfport-Biloxi Regional Airport, Gulfport, Mississippi. The aircraft was being operated by Universal Airways, Inc., under 14 CFR 135.

The aircraft took off from runway 17 and reached an altitude of 100 feet at the departure end of the runway. At this time, the pilot told Gulfport Tower, "Universal 76 is taking it around, going to land, going to land on 13." Witnesses stated that as the aircraft began a right turn the nose "pitched up" following which the aircraft immediately entered a steep dive, which it maintained until ground impact. All eight occupants were killed; there was no fire after impact.

The investigation revealed that the nose baggage door came open on takeoff and struck the left propeller. The door apparently had not been secured properly by the station agent who had removed baggage from the compartment.

The forward baggage compartment door is hinged at the top and is opened by turning a D-shaped handle. The latching mechanism incorporates three sliding bayonet latches which are held in the latched position by an overcenter cam. A microswitch is mounted ahead of the forward bayonet and door frame and is connected in series to the left engine starter switch. The door must be fully latched and the microswitch actuated by the pressure of the bayonet point before the engine can be started. This feature was designed by Beech to ensure safety of operation of the aircraft. On N777AE, however, the safety interrupt feature had been bypassed by a wire installed between the battery terminals of the two engine magneto/start switches. This allowed both engines to be started even though the door was not fully latched.

2613-D

In a similar accident involving a Ross Aviation Beech 65-80 (Queen Air) at Albuquerque, New Mexico, on May 19, 1972, nine persons were killed. As a result of that accident and a similar accident involving a Beech 99, the Safety Board issued Safety Recommendations A-72-78 through -81 directed to the Administrator. These recommendations dealt with the need for: secondary locking devices; cargo restraint systems; an alert to all air taxi operators; rulemaking to revise 14 CFR 135; and evaluation of the applicability of 14 CFR 23.787(b) to this type of nose cargo compartment.

The FAA issued an alert to all operators and owners regarding the need for positive door closure and for rigging the door actuating mechanism in accordance with the manufacturer's instructions. In addition, the FAA responded that if the door latching mechanism was properly maintained and fully secured by the operator, the requirements for cargo compartments and cargo security and protection contained in 14 CFR 23.787(b) would be satisfied. As you may know, based on this response the recommendations were "Closed - Unacceptable Action" by the Board.

In 1976, Beech Aircraft Corporation surveyed 66 Beech Queen Airs that were equipped with nose baggage doors. The findings of the survey indicated that only 10 of the 66 aircraft had properly operating starter interrupt systems.

In view of these findings, the unacceptable response to our previous recommendations and the Gulfport accident, the Safety Board concludes that action is still required to prevent inadvertent opening of nose baggage doors in flight. Therefore, the Safety Board recommends that the Federal Aviation Administration:

Take action to provide double failure protection by means of a secondary locking device on nose baggage doors of light twin engine aircraft engaged in Part 135 operations. (Class II, Priority Action) (A-80-13)

Require that the nose baggage door interrupter system on all Beech Aircraft models so equipped be operational before flight. (Class II, Priority Action) (A-80-14)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.

By:  James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: February 26, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-15

On January 26, 1979, N7671Q, a Cessna 310Q, on a nonscheduled air taxi flight, made a hard landing at Beckley, West Virginia, which injured two passengers and damaged the airplane substantially.

The pilot-in-command was flying the light twin-engine airplane from the right seat. In the enclosed accident brief relative to this accident, this fact is stated as a significant "remark." While the pilot of the flight held instructor and instrument flight instructor certificates, he stated that he was not engaged in flight instruction from the right seat at the time of the accident; however, the left front seat was occupied by a pilot with only a single-engine rating. During the course of the investigation, a potential safety problem was identified which could contribute to similar accidents.

The Cessna 310Q is certificated for single-pilot operation. The flight instruments are positioned on the left side of the instrument panel. The National Transportation Safety Board's investigation disclosed that the flight instruments are difficult to see from the right front seat and that this may be true in other light twin-engine aircraft. Nevertheless, the regulations in 14 CFR Part 135 do not prohibit the pilot-in-command from occupying the right seat. The Safety Board believes that aircraft with similarly configured instruments should not be flown from the right seat by the pilot-in-command for 14 CFR Part 135 operations. 1/

1/ Although the instructor pilot in the accident aircraft was flying with a certificate of demonstrated ability because he had lost the sight of one eye, the recommendation is based on the fact that our investigation determined that the flight instruments were not adequately visible from the right seat to a person with normal vision.

2816-A

As a result of its investigation, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require that the pilot-in-command of a Part 135 air taxi or commuter air carrier flight occupy a seat in the pilot compartment which affords him the most direct view of the basic flight and navigation instruments with a minimal deviation from his normal position and line of sight when he is looking forward along the flightpath.
(Class II, Priority Action) (A-80-15)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, and BURSLEY, Members, concurred in this recommendation. GOLDMAN, Member, did not participate.


By: James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: March 13, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-19

On November 18, 1979, at 0447 m.s.t., a Transamerica Airline, L-188, N-859U, with three crewmembers and 27,000 pounds of cargo aboard, departed Hill Air Force Base, Utah. While climbing from 12,000 to 13,000 feet, the crew advised Salt Lake Center that it had lost all electrical power, and requested an immediate descent to VFR conditions with vectors to avoid high terrain. During the descent, the aircraft attained a high airspeed and rate of descent, and broke up in flight. Although the Safety Board's analysis has not yet been completed, the evidence developed in the investigation indicates that certain precautionary action should be initiated on an expedited basis.

Federal Aviation Regulations (14 CFR 121.305(j)) require that all turbojet aircraft be equipped with three gyroscopic bank-and-pitch indicators, the third of which is to be powered independently of the normal electrical generating system; this requirement, however, does not apply to large turboprop aircraft operating under 14 CFR 121 regulations. The Safety Board believes that had N-859U had a third attitude-indicating instrument aboard, the crew probably could have avoided the high airspeed and descent rates which contributed to the airplane breakup.

The Safety Board supported the 1969 proposed rulemaking to require the indicating instrument in all turbine engine powered transport category aircraft, including large turboprop aircraft. However, turboprop aircraft were not included in the final rule NPRM 69-26, which instituted the requirement for large turbojet aircraft.

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Accordingly, the Safety Board recommends that the Federal Aviation Administration:

Amend 14 CFR 121.305(j) to extend its application to all large turboprop aircraft to require an additional attitude-indicating instrument, for bank and pitch, operating from a source of power independent of the normal electrical generating system as is now required on all large turbojet aircraft. (Class II, Priority Action) (A-80-19)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in this recommendation.


By: James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

ISSUED: March 14, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-20 and -21

On March 8, 1980, a Swearingen SA-226 AT, N720R, with a crew of two and six passengers, experienced a rapid decompression at 16,000 feet when most of the aft cargo compartment door separated in flight. About 3/4 of the door along with interior furnishings, including an unoccupied passenger seat, separated from the aircraft. Two passengers were injured slightly during the decompression and the empennage was damaged slightly when some of the material from the cargo door or the cabin struck the upper fuselage and the vertical stabilizer. Some of the material from the cabin lodged around the control surfaces in the empennage. A safe landing was made in Albany, New York. Although ground search continues for the separated items, only baggage has thus far been recovered.

The National Transportation Safety Board's on-going investigation indicates that the aircraft was being operated at a pressure differential of approximately 7 psi to maintain an approximate sea level pressure. Preliminary examination of the aircraft indicates that there were static failures of the door's latching mechanism, possibly because the mechanism was adjusted improperly.

A review of the Service Difficulty Reports on this type door showed that there have been 29 reports of various problems, including bent latches, stuck pins, misadjustments, and broken cables. There have been no previous reports of structural problems, failures, or in-flight separations.

There are about 200 of these aircraft in operation and a large number of them are being used in commuter/air taxi operations. The accident aircraft had accumulated about 2,200 hours of operation at the time of the accident.

The Safety Board has been advised that the aircraft manufacturer is preparing an Alert Service Bulletin to all owner/operators of this aircraft which will recommend inspection and adjustment, as required, of the door latching mechanism.

2906

In view of the potential for a catastrophic accident, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue a telegraphic Airworthiness Directive requiring an immediate inspection of the door latching mechanism of the aft cargo doors on all Swearingen SA-226 aircraft to assure proper adjustment and structural integrity. (Class I, Urgent Action) (A-80-20)

Issue an Airworthiness Directive restricting the cabin pressure differential in Swearingen SA-226 aircraft until the cause of the aft cargo door failure can be determined and an appropriate corrective action carried out. (Class I, Urgent Action) (A-80-21)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.


By: James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

ISSUED: March 26, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-22 and -23

On May 30, 1979, at 2100 e.d.t., a deHavilland DHC-6-200 (N68DE) owned and operated by Downeast Airlines, crashed while making a "localizer only" approach to runway 3 at the Knox County Regional Airport, Rockland, Maine. Both flight crewmembers and 15 of the 16 passengers were killed; the surviving passenger was injured seriously.

The National Transportation Safety Board's investigation of the accident revealed that although instrument approaches to the Knox County Regional Airport are from the south, there are no reference visibility markers to measure low visibility conditions south of the airport. In addition, the Board notes that there are no published guidelines which specify the number and location of visibility markers needed at airports to assure representative surface visibility values.

Runway 3 at Knox County Regional Airport has a localizer only approach and a nondirectional beacon approach, and is used for instrument approaches. When the Rockland barometer is used, the minimum visibility for the localizer approach is 3/4 statute mile. At 2030, a surface visibility observation of 3/4 statute mile was transmitted to N68DE. This observation was based on the sighting of a lighted visibility marker located about 3/4 statute mile north of the airport. All visibility markers at Rockland located within 1.5 statute miles of the airport are to the north and west of the airport. In this circumstance it is highly unlikely that the visibility information available to the pilot of N68DE both before and during his approach to runway 3 was representative of the actual conditions. Since the only instrument approaches to the airport are made from the south, the Safety Board believes that more representative visibility information for the approach and landing should be made available by installing lighted visibility markers to the south of the airport.

Federal Meteorological Handbook No. 1, chapter A6, paragraphs 2.7 and 3.5, specify the types and the selection criteria for visibility markers. Meteorological Service for International Air Navigation Annex 3 to the Convention of International Civil Aviation recommends in paragraph 4.5.2 that "for reports for takeoff the visibility observations should be representative of the takeoff and climb out area, and for reports for landing the observations should be representative of the approach and landing area." However, neither the Federal Aviation Administration nor the National Weather Service publishes

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criteria for the location and number of visibility markers needed at airports to assure representative values of surface visibility. The Safety Board believes that a uniform set of guidelines should be developed to specify the location and number of visibility markers appropriate for airports to assure representative surface visibility values.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Insure that lighted visibility markers are installed south of the Knox County Regional Airport, Rockland, Maine, within sight in clear visibility conditions of the normal weather observation position. One of the markers should be placed about 3/4 statute mile from the point of observation. (Class II, Priority Action) (A-80-22)

Establish guidelines on the location and number of visibility markers necessary at airports to assure representative surface visibility values for airport runways and the airport runway environment. (Class II, Priority Action) (A-80-23)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.

By:  James B. King
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

ISSUED: March 27, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-24 and -25

On April 21, 1979, a Piper Model PA-18 Super Cub crashed at the Lebanon Regional Airport, Lebanon, New Hampshire. The sky was clear and although the wind was calm, the airplane was observed to bounce severely several times during the attempted landing. The airplane then turned right, and a go-around was initiated. Shortly thereafter, the aircraft crashed near the airport boundary and burned. The pilot was killed, and his passenger was seriously injured.

The pilot had flown this new airplane from the Piper factory at Lock Haven, Pennsylvania, and was in the process of delivering it to Lebanon when the accident occurred. Although he had accumulated several hundred flight hours in tricycle gear aircraft, his experience in tailwheel airplanes was limited to about 5 hours. Moreover, before the date of the accident, he had not flown in a tailwheel airplane for 2 years. While the pilot made a number of takeoffs and landings with a flight instructor in the PA-18 immediately before he departed for Lebanon, the Safety Board believes that the scope of this familiarization was inadequate and did not prepare him sufficiently to take charge of the aircraft.

The Safety Board believes that the severe bouncing observed during the landing attempt clearly indicates that the pilot did not perform the landing flare maneuver properly. Moreover, lack of skill in the operation of tailwheel airplanes was further evidenced by the pilot's delay in initiating a go-around. The go-around, although belated, would still have been successful if the pilot had been thoroughly familiar with this aircraft. Lacking such familiarity however, he apparently failed to retrim the airplane from an approach trim setting to a go-around setting since the adjustable stabilizer was found in the full airplane nosedown position. The resultant stick forces would have been very high during the attempted go-around and particularly disconcerting to this pilot with limited experience in tailwheel airplanes.

2901

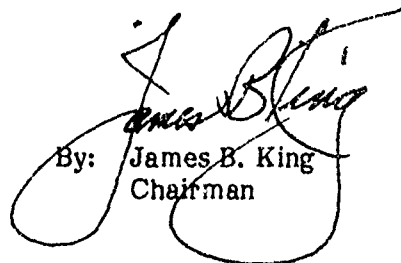
The safe operation of tailwheel airplanes requires a unique measure of operational familiarization that is not transferable from experience in tricycle gear aircraft. Tailwheel airplanes are especially prone to loss of directional control during takeoff and landing, and to severe bouncing if the landing is not performed properly. The pilot's knowledge and level of proficiency concerning crosswind takeoffs and landings, power (wheel) landings, recovery from bounced landings, and go-around procedures is particularly critical to safe operation of tailwheel aircraft. A special study ^{1/} by the Safety Board has shown that the total accident rate for tailwheel aircraft is more than twice that of aircraft with tricycle landing gear.

The Safety Board believes that an adequate checkout of pilots in tailwheel airplanes is essential and that continued safe operation of these airplanes requires a minimum level of recent experience somewhat greater than presently required. The checkout should focus on safe takeoffs and landings and should provide measurable assurance of the pilot's capability to operate the airplane in all phases of flight. Consequently, the Safety Board recommends that the Federal Aviation Administration:

Amend FAR 61.31, "General Limitations," to require that before acting as pilot-in-command of a tailwheel airplane, a private or commercial pilot receive flight instruction (including all normal and contingent aspects of takeoffs and landings) from an authorized flight instructor who has found him competent to pilot such airplanes and has so endorsed his pilot logbook. This requirement need not apply to pilots who have logged flight time as pilot-in-command in tailwheel airplanes before the effective date of this amendment. (Class II, Priority Action) (A-80-24)

Amend FAR 61.57, "Recent Flight Experience: Pilot in Command (c) General Experience," to make more stringent the currency requirements for the pilot in command of a tail wheel configured airplane carrying passengers. (Class II, Priority Action) (A-80-25)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.


By: James B. King
Chairman

^{1/} "Single-engine, Fixed-wing General Aviation Accidents, 1972-1976 (NTSB-AAS-79-1).